DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

LACOMBE, ALBERTA

REPORT OF THE SUPERINTENDENT

F. H. REED, B.S.A.

FOR THE YEAR 1929

Ploughing drills for planting potatoes.

Published by Authority of the Hon. Robert Weir, Minister of Agriculture
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DOMINION EXPERIMENTAL STATION, LACOMBE, ALBERTA

SEASONAL NOTES

The season of 1929 was unusually dry with frequent high winds. The total precipitation of 12·92 inches was, with the exception of the years 1920 and 1922, the lowest in 22 years. The precipitation for the growing period, with May 1·42 inches; June 1·35; July only 0·63 and August 1·52 inches, was quite the lowest in 22 years. Unusually high winds during May and June caused heavy evaporation and some soil drifting. As a result of this combination of conditions the yields of all crops were the lowest on record at this Station. A two-day rain on August 3 and 4 with a total of one inch came at the critical time for filling and as there was no frost in July or August the grain, though very low in yield, was high in quality. A large percentage of the wheat graded No. 1 Northern for the first time in years.

Forage crops were very low in yields. Corn was almost a failure and sunflowers were very short. Hay yielded about one ton per acre. With only 0·83 of an inch of rain in September and October, following the very dry summer, fall pastures were very short and covered with dust and live stock went into winter below the average in condition. With very low yields of coarse grains, straw and hay a feed shortage is inevitable.

METEOROLOGICAL RECORDS, 1929

—	Temperature (°F.)						Precipitation				Sunshine		Wind	Evaporation	—
	Mean		Maximum		Minimum				Total precipitation						
	1929	Average 22 years	Highest in 1929	Mean Maximum for 22 years	Lowest in 1929	Mean Minimum for 22 years	Rain	Snow	1929	Average 22 years	1929	Average 22 years			
							in.	in.	in.	in.	hours	hours	miles	in.	
an.....	−1·69	9·00	48·0	44·59	−53·0	−36·5	.....	9·6	0·96	0·87	92·2	85·0	4,336	.....	
eb.....	8·82	13·32	42·0	50·52	−40·0	−31·47	.....	10·50	1·05	0·64	127·8	125·2	4,551	.....	
Iar.h....	28·84	21·79	58·0	56·22	−03·0	−17·8	0·23	3·70	0·60	0·70	187·7	163·6	6,208	.....	
pril.....	33·93	36·79	71·0	70·98	−04·0	7·15	0·69	11·0	1·70	1·17	196·9	210·5	6,107	0·448	Starting
ay.....	48·0	48·68	78·0	80·38	23·0	19·44	1·01	4·1	1·42	1·88	264·6	241·9	7,241	2·832	April 25
une.....	55·96	55·45	80·0	84·08	31·0	29·71	1·35	.....	1·35	3·38	287·9	256·9	6,509	5·013	
uly.....	61·13	60·0	94·0	88·25	34·0	34·23	0·63	.....	0·63	2·75	364·2	294·7	6,227	5·141	
ug.....	61·16	58·05	98·0	87·87	33·0	31·78	1·52	.....	1·52	2·53	299·2	259·9	5,180	3·636	
ept.....	46·77	48·46	80·0	81·26	18·5	20·88	0·63	.....	0·63	1·65	176·6	190·8	5,437	2·204	
ct.....	44·42	40·26	80·0	79·10	9·0	8·27	0·21	.....	0·21	0·65	189·2	150·2	5,484	1·312	Com-
ov.....	27·53	25·58	64·0	58·00	−16·0	− 9·82	0·60	12·0	1·80	0·77	104·9	109·0	6,134	.....	pleted
ec.....	28·39	12·82	45·0	48·11	−32·0	−29·00	.....	10·5	1·05	0·71	76·0	84·5	5,142	.....	Oct. 28.
Totals..	.....	.....	.....	.....	.....	.....	.....	.....	12·92	17·70	2367·2	.....	.....	.....	.....

ANIMAL HUSBANDRY

HORSES

The horses kept at this Station numbered thirty-seven head of all ages at the close of the year and consisted of one imported Shire stallion, eleven pure-bred Clydesdales, twelve Shire-Clydesdale cross-breds, seven grade Clydesdales, two pure-bred Hackneys, one Hackney-Thoroughbred cross-bred, two

Thoroughbreds and one driving mare. Four of the Shire Clydesdale cross-breds are from the Shire stallion "Snelston Topper"—1608— (38528) which was presented to the Canadian Government by Mrs. Stanton, Snelston Hall, Ashbourne, England.

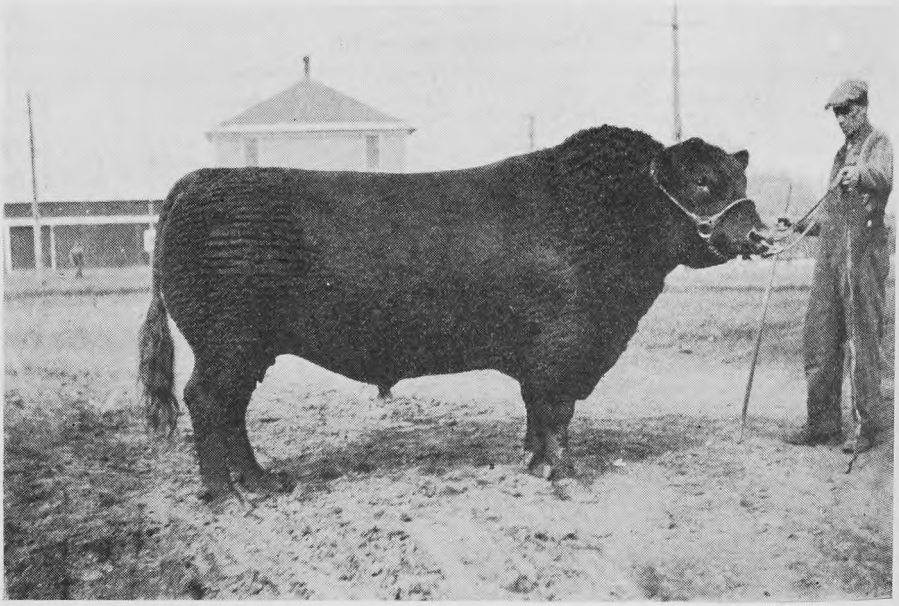
Two foals were born during the year. As a preventive of joint ill the pregnant dams were given a teaspoonful of potassium iodide on the first and fifteenth of each month. The foals showed no indication of joint ill.

BEEF CATTLE

The pure-bred Aberdeen-Angus herd of beef cattle kept at this Station has suffered severely in reduction in numbers during the past year. A series of blood tests made for bacillus abortus of Bang, the causative organism of a large percentage of abortions, revealed a large number of reactors in the herd. All cattle giving evidence of being spreaders of infection were disposed of for beef. At the end of 1929 there were thirty-one head of cattle as follows: two mature bulls, one yearling bull, two yearling steers, two bull calves, nine mature cows, three 2-year-olds, six yearlings and six heifer calves. At the end of the previous year the herd totalled forty-six head.

Fourteen calves were dropped in the herd during the year, of which nine were heifer calves. Of the fourteen calves, six were abortions.

The herd again successfully passed the annual tuberculin test in November and maintained full accredited standing.



Blackcap of Heatherbrook—35016—Aberdeen-Angus, junior herd sire.

A slaughter of the reactors to the blood test for contagious abortion, from time to time during the past year, left the herd so badly depleted that it has been impossible to carry on beef cattle feeding experimental work. The blood test has also, to a great extent, interfered with sales of pure-bred breeding stock to farmers.

Final disposition has been made of all the reactors and the herd is now placed on a definite clean footing as indicated by the blood test.

During the year three pure-bred Aberdeen-Angus bulls wre sold at the Calgary Spring Sales at an average price of $316.66.

BLOOD TEST FOR ABORTION

In co-operation with the Pathological Division of the Health of Animals Branch a series of tests have been made for bacillus abortus of Bang, the causal organism of contagious abortion. All cattle in the herd regardless of age or sex have been tested with the object of gaining information as to whether it is possible and practicable to eradicate bovine contagious abortion and allied diseases by means of the agglutination and complement fixation blood tests. Tests were made in February, May, September and December. These tests along with one taken in November 1928 give some valuable and interesting data. In analyzing the situation to date with regard to the results of this test it might be pointed out that none of the cows and heifers of breeding age which gave negative reactions have at any time in their breeding history been actually credited with an abortion. On the other hand, three of the females which have freshened at least once and gave positive reactions, have never aborted and have been fairly regular breeders. From the first year's results, it would appear that the blood test may be looked upon as a fairly reliable guide in the matter of indicating individuals in the herd that were harbouring infection.

Information regarding all animals which gave positive reactions to the test is given in the following tables:—

COWS WHICH HAVE FRESHENED AT LEAST ONCE AND HAVE GIVEN A POSITIVE REACTION

Name	Date of birth	Dam's reactions	Serum reactions					Aborted, yes or no	Number of times aborted	Number of living calves	History
			Nov. 1928	Feb. 1929	May 1929	Sept. 1929	Dec. 1929				
L.E.S. Flower Queen 3rd	May 7, 1918	Not tested	P	.....	.....	.....	.....	No	.....	8	A regular breeder.
L.E.S. Norma Gordon	Mar. 6, 1919	Not tested	P	.....	.....	.....	.....	Yes	1	7	A regular breeder. Aborted Dec. 1923.
L.E.S. Princess Erica	Nov. 27, 1919	Not tested	P	.....	.....	.....	.....	No	.....	6	Difficult to get in calf fifth time.
L.E.S. Blackbird Queen	May 19, 1920	Not tested	P	P	.....	.....	.....	Yes	3	1	Aborted, Dec. 6, 1923; July 22, 1927; April 9, 1928.
Blackcap Glencarnock 7th	Dec. 1, 1923	Not tested	P	P	.....	.....	.....	Yes	1	2	Aborted, Nov. 29, 1928. Otherwise regular breeder.
Revolution Keepsake L.E.S.	Oct. 30, 1924	Not tested	N	P	.....	.....	.....	Yes	1	2	Aborted, April 29, 1929. Otherwise regular breeder.
Queen Revolution L.E.S.	Jan. 13, 1925	Not tested	P	P	.....	.....	.....	Yes	1	2	Aborted Jan. 16, 1929. Difficult to get in calf third time.
Blackbird Revolution L.E.S.	Mar. 7, 1925	Not tested	P	P	.....	.....	.....	Yes	1	1	Aborted March 4, 1928. Difficult to get in calf first time.
Miss Burgess McGregor 16	Mar. 10, 1925	Not tested	N	N	?	P	P	Yes	1	2	Aborted, Dec. 27, 1929. Difficult to get in calf third time.
Lacombe Blackbird	July 15, 1925	N	P	P	.....	.....	.....	Yes	1	1	Aborted Nov. 5, 1927. Difficult to get in calf second time.
Lacombe Queen 4th	May 6, 1926	P	P	.....	.....	.....	.....	No	.....	1	Good history.
Lacombe Erica Blackbird	July 4, 1926	N	P	.....	.....	.....	.....	Yes	1	.....	Aborted Dec. 29, 1928.
Lacombe Princess Blackbird	Sept. 26, 1926	N	N	N	P	P	.....	Yes	1	.....	Aborted May 1, 1929.
Lacombe Norma Gordon	Jan. 16, 1927	P	P	P	.....	.....	.....	Yes	1	.....	Aborted Feb. 27, 1929.
Lacombe Queen Erica	Mar. 13, 1927	P	N	P	P	P	.....	Yes	1	.....	Aborted June 19, 1929.

Three cows in this group have never aborted and have been fairly regular breeders. It should also be noted that although some of the cows gave a negative reaction in November 1928, and February 1929, they became infected at a later date.

P—Positive.
N—Negative.
?—Questionable.

HEIFERS WHICH HAVE NEVER FRESHENED AND HAVE GIVEN A POSITIVE REACTION: ALSO BULLS THAT HAVE GIVEN A POSITIVE REACTION

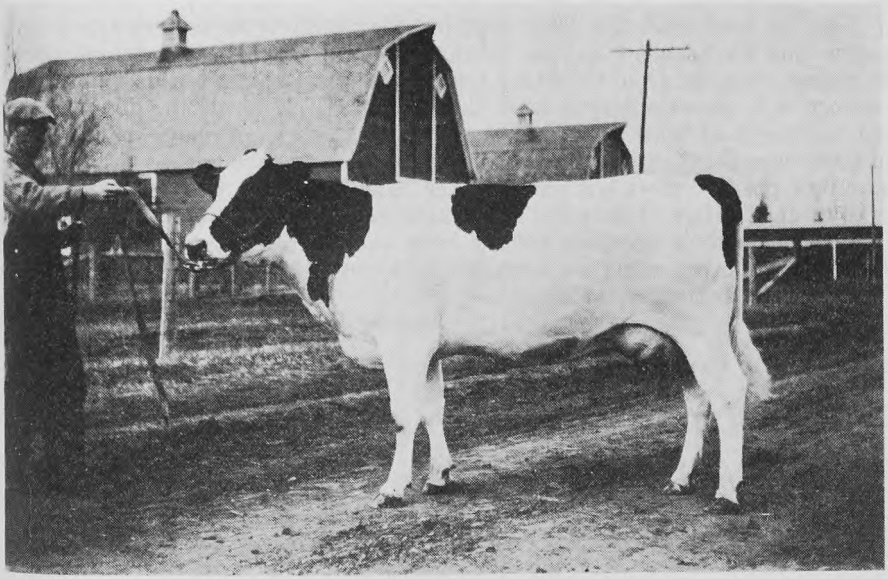
Name	Date of birth	Sex	Dam's reactions	Serum reactions					Remarks
				Nov. 1928	Feb. 1929	May 1929	Sept. 1929	Dec. 1929	
Lacombe Millicent 4th	June 7, 1926	Female	Not tested	N	P	P	P	.....	Could not get in calf.
Lacombe Pride Millicent	Jan. 7, 1927	Female.	N	P	P	.....	.....	.....	In calf when sold.
Lacombe Erica Keepsake	June 10, 1927	Female.	Both	N	P	P	P	.....	In calf when sold.
Lacombe Queen Erica 2nd	Jan. 22, 1928	Female.	P	N	?	P	P	.....	In calf when sold.
Lacombe Erica Keepsake 2nd.	May 13, 1928	Female.	Both	?	P	?	P	P	
Lacombe Pride Millicent 2nd.	Aug. 29, 1928	Female.	N	N	N	N	P	P	
Lacombe Prideman Prince	Aug. 6, 1927	Male...	Both	P	P	.....	.....	.....	
Lacombe Earl Eric 5th	Dec. 17, 1927	Male...	P	N	P	.....	.....	.....	
Lacombe Revolution 3rd	July 4, 1928	Male...	N	N	N	N	P	.....	
Calf of L.E.S. Princess Erica..	Sept. 21, 1928	Male...	P	P	.....	.....	.....	.....	
Calf of L.E.S. Norma Gordon	Oct. 23, 1928	Male...	P	P	.....	.....	.....	.....	

P—Positive.
N—Negative.
?—Questionable.

DAIRY CATTLE

The pure-bred Holstein-Friesian herd of dairy cattle kept at this Station received a rather serious setback during the year owing to the loss of a number of the best mature females, and also the loss of some very promising young females intended for future use in the herd, through the slaughter of all reactors to the blood test for Contagious Abortion. At the end of 1929 there were thirty-two head of cattle as follows: two mature bulls; seven bull calves; eight mature cows; four three-year-olds; two two-year-olds; six yearlings and three heifer calves. At the end of the previous year the herd totalled thirty-six head.

Eighteen calves were dropped in the herd during the year, of which only six were heifer calves. Of the eighteen calves three were abortions, one died shortly after birth from scours and pneumonia and one died at five and one-half months of age of acute indigestion.



Lacombe Keyes DeKol Segis—161804—3 year-old Holstein.

In November, 1929, the yearly test for accreditation was made and the herd again found free from tuberculosis.

The average production of the eleven cows finishing a lactation period within the calendar year 1929 was 15,964 pounds of milk and 682 pounds of butter for an average milking period of 392 days. Three mature cows and one 4-year-old cow completed 365-day R.O.P. records averaging 18,236 pounds of milk and 790·7 pounds of butter. Four 2-year-old heifers completed 365-day R.O.P. records averaging 13,126 pounds of milk and 563·75 pounds of butter. Two mature cows completed 305-day R.O.P. records averaging 12,978 pounds of milk and 543·5 pounds of butter.

Like the beef herd the dairy herd is now on a definite clear footing as indicated by the blood test.

ADVANCED REGISTRATION OF DAIRY FEMALES AND DAIRY BULLS

The herd has been subjected to inspection under the Advanced Registry rules of the Canadian Holstein-Friesian Association since 1927. During that time all of the eligible females have duly passed official inspection by the Association; one qualifying for registration in Class Gold Medal; six in Class Excellent; thirteen in Class Good; and five in Class Fair. For bulls, eleven X and two XX certificates have been secured since 1927.

The system of advanced registration for females is based on type and production, the object being to weed out of the pure-bred list any animals that do not measure up to a certain standard of individual excellence, and to give credit to those that have the required individual excellence, plus good milk record backing.

With bulls the object of the advanced registration is to put a premium on individuals of the right type with good record backing so as to effect more rapid improvement, and also to facilitate the sale of such bulls by correspondence, as the intending buyer will know that when he gets a Class X or Class XX certificate with a bull that he is a worthy specimen of the breed.

BLOOD TEST FOR ABORTION

Like the beef herd, the dairy herd has been subject to the combined agglutination and complement fixation blood test during the past fourteen months. The results obtained from the blood test on the dairy cattle are in some respects in accord with those obtained from the beef herd. Nine of the females which have freshened at least once and gave positive reactions, have never aborted and have been fairly regular breeders. This is not what would be expected from a group of positive cows but on the other hand, with but two exceptions, all of the cows and heifers of breeding age which gave negative reactions have never at any time in their breeding history been actually credited with an abortion.

Information regarding all animals which gave positive reactions to the test is given in the following tables:—

COWS WHICH HAVE FRESHENED AT LEAST ONCE AND HAVE GIVEN A POSITIVE REACTION

Name	Date of birth	Dam's reaction	Serum reactions					Aborted, yes or no	Number of times aborted	Number of living calves	History
			Nov. 1928	Feb. 1929	May 1929	Sept. 1929	Dec. 1929				
L.E.S. Mechthilde Korndyke	Oct. 23, 1921	Not tested	P	.....	.....	.....	.....	Yes	1	3	Aborted Jan. 26, 1924, irregular breeder.
L.E.S. Nina Mechthilde.....	Nov. 1, 1921	Not tested	P	P	P	P	P	No	.....	5	Fairly regular breeder
Nina Gem Mechthilde L.E.S.	Feb. 6, 1922	Not tested	P	.....	.....	.....	.....	Yes	4	1	Aborted April 2, 1924, Sept. 3, 1925 Oct. 17, 1927, Sept. 11, 1928.
May Korndyke Lee L.E.S...	April 14, 9122	Not tested	P	P	P	P	.....	Yes	1	5	Fairly regular breeder.
Rosa Keyes L.E.S.....	April 16, 1922	Not tested	P	P	P	P	.....	No	.....	5	Fairly regular breeder.
Korndyke Evergreen L.E.S..	Dec. 5, 1922	Not tested	P	.....	.....	.....	.....	No	.....	2	Very difficult to get in calf.
Rosa Korndyke L.E.S.....	April 19, 1923	Not tested	P	.....	.....	.....	.....	No	.....	3	Very difficult to get in calf third time.
Nina Gem Korndyke L.E.S.	May 3, 1923	Not tested	P	P	P	P	.....	No	.....	4	Fairly regular breeder.
Evergreen Korndyke L.E.S..	Dec. 23, 1923	Not tested	P	P	P	P	.....	Yes	1	3	Difficult to get in calf third time.
Lacombe Nina Mechthilde..	Jan. 1, 1926	P	P	.....	.....	.....	.....	No	.....	1	Very difficult to get in calf.
Lacombe Alcartra Keyes....	April 4, 1926	P	P	P	.....	.....	.....	No	.....	1	Very difficult to get in calf.
Lacombe Evergreen Korndyke	April 15, 1926	P	P	P	P	P	.....	No	.....	2	Regular breeder.
Lacombe Rosa Keyes.....	May 2, 1926	P	P	P	P	P	P	No	.....	2	Very difficult to get in calf first time.
Lacombe Helbon DeKol.....	Jan. 11, 1927	N	N	N	P	P	.....	Yes	1	.....	Difficult to get in calf.
Lacombe Korndyke DeKol Segis.....	Feb. 27, 1927	P	N	?	P	P	.....	Yes	1	.....	Good history.

P—Positive.
N—Negative.
?—Questionable.

HEIFERS WHICH HAVE NEVER FRESHENED AND HAVE GIVEN A POSITIVE REACTION; ALSO BULLS WHICH HAVE GIVEN A POSITIVE REACTION

Name	Date of birth	Sex	Dam's reactions	Serum reactions					Remarks
				Nov. 1928	Feb. 1929	Sept. 1929	May 1929	Dec. 1929	
Lacombe Rosa Echo	Feb. 16, 1926	Female.	Not tested	P	.....	.....	.....	.....	Could not get in calf
Lacombe Ormsby Dekol	Jan. 22, 1927	Female.	N	P	.....	.....	.....	.....	In calf when sold.
Lacombe Gretchen Dekol	May 27, 1928	Female.	N	N	P	P	P	.....	
Lacombe May Korndyke	June 27, 1928	Female.	N	N	P	P	P	.....	
Lacombe Korndyke Gretchen	Sept. 29, 1928	Female.	N	N	N	N	P	P	
Lacombe Evergreen Fairchild	July 30, 1928	Male...	P	P	.....	.....	.....	.....	
Lacombe Pontiac Keyes	Sept. 1, 1928	Male...	P	P	.....	.....	.....	.....	
Calf of Lacombe Rosa Keyes	Oct. 22, 1928	Male...	P	P	.....	.....	.....	.....	
Lacombe Korndyke Fairchild	May 27, 1929	Male...	P	.....	.....	.....	P	.....	
Male calf of Lacombe Evergreen Korndyke	Nov. 7, 1929	Male...	P	.....	.....	.....	.....	P	

P—Positive.
N—Negative.

OFFICIAL RECORDS

All normal cows and heifers that have not previously been tested or that look like bettering previous records are entered in the Canadian Record of Performance for Pure-Bred Dairy Cattle as soon as they freshen, in order that all bulls sold from the herd may have the necessary credentials in the way of official records. The 305-day record is the objective as there is a calving limit of 400 days, but where they do not hold to a service early enough to have them drop a calf within the time limit for the 305-day division, they are carried on for the 365-day record.

The following table gives the list of cows qualifying under each of these tests during the year:—

RECORD OF COWS

Name of cow	Class	Number of days milking	Pounds of milk produced	Average per cent fat	Pounds of fat produced	Pounds of 85 per cent butter
			lb.	%	lb.	lb.
L.E.S. May Echo Korndyke	Mature	365	21,129	3·73	789	926
L.E.S. Mechthilde Korndyke	Mature	365	19,264	3·66	705	829
Korndyke Gretchen L.E.S.	Mature	365	16,405	3·46	568	668
Evergreen Korndyke L.E.S.	4-yr-old	365	16,145	3·90	629	740
Lacombe May Gretchen	2-yr-old	365	13,951	3·80	530	623
Rosa Keyes L.E.S.	Mature	305	13,701	3·47	475	559
Lacombe Rosa Keyes	2-yr-old	365	13,003	3·45	449	528
Lacombe Midnight Gretchen	2-yr-old	350	12,892	3·46	445	523
Lacombe Evergreen Korndyke	2-yr-old	365	12,699	3·89	494	581
Nina Gem Korndyke L.E.S.	Mature	305	12,255	3·66	449	528

This gives an average production for ten animals of 15,144 pounds of milk and 553 pounds fat equal to 651 pounds of 85 per cent butter in 351 days.

MILK PRODUCTION OF PURE-BRED COWS

Following will be found a table giving the milk and fat production and feed consumption records for all cows and heifers which have finished a normal lactation period during the year 1929. In addition to those reported there are several cows that have not completed a milking period during the year and two heifers which are now milking in their first period. The feed charges given in this table are for the feed during the actual period of milking, no allowance being made for the dry period previous to calving.

Name of cow	Number of lactation period	Number of days in milk	Total pounds of milk for period	Daily average yield of milk	Average per cent fat in milk	Pounds fat for period	Pounds butter for period	Value of butter at 40 cents a pound	Value of skim-milk at 20 cents per cwt.	Total value of product	Amount of meal eaten	Amount of ensilage eaten	Amount of roots eaten	Amount of hay eaten	Months on pasture at $1.50 a month	Total cost of feed for period	Cost of feed to produce 100 pounds milk	Cost to produce 1 pound butter, skim-milk neglected	Profit on 1 pound butter, skim-milk neglected	Profit on cow for period, labour and calf neglected
		days	lb.	lb.	%	lb.	lb.	$	$	$	lb.	lb.	lb.	lb.	mos.	$	$	cts.	cts.	$
L.E.S. May Echo Korndyke	4	551	27,520	49·9	3·73	1,026	1,207·06	482 82	52 99	535 81	8,163	15,820	4,330	5,150	7	234 45	0 85	19·4	20·6	301 36
L.E.S. Mechthilde Korndyke	5	395	20,267	51·3	3·66	742	872·94	349 18	39 05	388 23	5,980	12,325	2,150	4,125	4	171 62	0 85	19·7	20·3	216 61
Evergreen Korndyke L.E.S.	2	454	17,408	38·3	3·90	679	798·82	319 53	33 46	352 99	5,112	14,725	2,364	5,010	4	168 40	0 97	21·1	18·9	184 59
Korndyke Gretchen L.E.S.	3	410	17,281	42·1	3·46	598	703·53	281 41	33 37	314 78	5,086	11,235	2,246	3,450	6	151 97	0 88	21·6	18·4	162 81
Lacombe May Gretchen	1	375	14,100	37·6	3·80	536	630·59	252 24	27 13	279 37	4,135	11,065	2,393	3,850	4	135 35	0 96	21·5	18·5	144 02
Lacombe Evergreen Korndyke	1	373	12,854	34·5	3·89	500	588·24	235 30	24 71	260 01	3,743	11,140	2,325	3,795	4	128 05	1 00	21·8	18·2	131 96
Rosa Keyes L.E.S.	4	323	13,755	42·6	3·47	477	561·18	224 47	26 56	251 03	4,064	9,780	2,297	3,495	3	127 13	0 92	22·7	17·3	123 90
Nina Gem Korndyke L.E.S.	3	340	12,781	37·6	3·66	468	550·59	220 24	24 63	244 87	3,698	10,170	2,468	3,440	4	123 03	0 96	22·3	17·7	121 84
L.E.S. Evergreen Johanna	8	361	13,599	37·7	3·30	449	528·24	211 30	26 30	237 60	3,930	10,495	2,180	3,616	4	128 34	0 94	24·3	15·7	109 26
Lacombe Rosa Keyes	1	375	13,142	35·0	3·45	453	532·94	213 18	25 38	238 56	3,828	11,290	2,374	3,705	4	129 30	0 98	24·3	15·7	109 26
Lacombe Midnight Gretchen	1	350	12,892	36·8	3·46	446	524·71	209 88	24 89	234 77	3,790	10,875	2,416	3,660	3·5	126 82	0 98	24·2	15·8	107 95
Total for herd (11 cows)	.....	4,307	175,599	.....	.....	6,374	7,498·84	2,999 55	338 47	3,338 02	51,529	128,920	27,543	43,296	47·5	1,624 46	.....	.....	.....	1,713 56
Average for herd (11 cows)	.....	391·55	15,963·55	40·77	3·62	579·45	681·71	272 69	30 77	303 46	4,684·5	11,720	2,503·9	3,936	4·3	147 68	0 925	21·7	18·3	155 78

The profit column shows a comparison only between cost of feed and value of milk produced. The labour cost of caring for the cattle, the manufacture of butter, the interest on the investment, depreciation, etc., are not included nor is the value of calf at birth.

Butter is computed at 40 cents per pound and skimmilk at 20 cents per 100 pounds.

In estimating the cost of feeds the following values were used.

Meal (oats, bran and oil cake)	$35 00 per ton
Corn and sunflower ensilage	4 00 per ton
Roots (Swede turnips and mangels)	5 00 per ton
Mixed hay	15 00 per ton
Pasture per month per cow	1 50

These values represent the cost of raising in the case of home-grown feeds and the actual cost price in the case of mill feeds, factory by-products, etc., that are purchased.

The average feed cost to produce one hundred pounds of milk at this Station during the last three years has been 97·2 cents in 1927, 99·6 cents 1928 and 92·5 cents in 1929, averaging 96·43 cents for the three years.

The daily average yield of milk in 1927 was 39·9 pounds; in 1928, 39·4 pounds; and in 1929, 40·8 pounds.

The average percentage of fat in the milk in 1927 was 3·48; in 1928, 3·64; and in 1929, 3·62 per cent.

SWINE

The breeding stock at the Station at the end of the year was made up of thirty-nine Yorkshire sows and gilts and four Yorkshire boars, thirteen Tamworth sows and gilts and two Tamworth boars; twelve Bershire sows and gilts and two Berkshire boars and one cross-bred sow, making a total of sixty-five head of sows and gilts and eight boars.

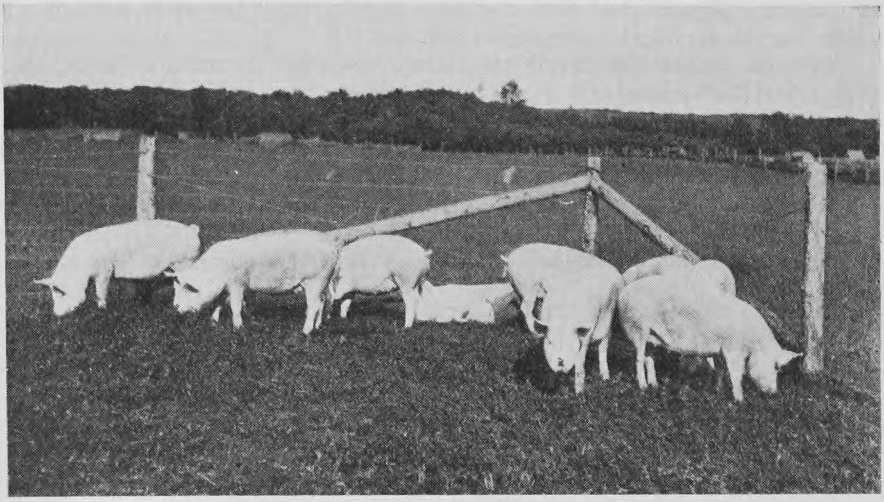
During the year two Yorkshire boars, bred at the Central Experimental Farm, Ottawa, have been added to the herd. In addition, a Berkshire boar, obtained from the Central Experimental Farm, Ottawa, and a Tamworth boar from D. H. Galbraith, Vulcan, Alta., should strengthen the Berkshire and Tamworth herds.

This has been a profitable year with swine at this Station. Pork prices throughout the year were on a steady basis with a gradual advance in price from the first of the year to a top in July and then a decline to a low in October, after which the trend was steadily upward to the end of the year. There has been a wide demand for breeding stock, both boars and sows. Yorkshires are still quite the most in demand, there being a greater call for breeding stock of this breed than could be filled.

FARROWING STATEMENT FOR 1929

—	Spring litters			Fall litters			Total spring and fall litters			Herd totals
	Yorks	Tams	Berks	Yorks	Tams	Berks	Yorks	Tams	Berks	
Number of litters farrowed in 1929	17	9	5	10	6	3	27	15	8	50
Total number of pigs farrowed	227	95	46	116	57	29	343	152	75	570
Number of pigs per litter (average)	13·3	10·5	9·2	11·6	9·5	9·7	12·7	10·1	9·4	11·4
Number of pigs dead at birth	27	19	3	14	5	.....	41	24	3	68
Number of pigs dead at birth per litter (average)	1·59	2·11	0·6	1·4	0·83	.....	1·52	1·6	0·37	1·36
Number of pigs died before weaning per litter (average)	4·64	3·33	1·4	4·4	2·33	1·33	4·55	2·93	1·37	3·55
Number of pigs weaned per litter (average)	8·70	7·22	7·8	7·2	7·16	8·33	8·14	7·2	8·0	7·84
Percentage of pigs, farrowed alive, raised	73·95	85·50	90·70	70·59	82·61	86·17	72·77	84·37	88·89	78·09

The above statement shows that fifty litters were raised during the year, of which thirty-one were spring and nineteen were fall litters. The litters averaged 11·4 pigs per litter farrowed and 7·8 per litter raised.



Advanced registry litter of ten Yorkshires.

Litters farrowed after July 1 are called fall litters, as they must be grown and finished mainly under fall and winter conditions. Generally speaking it is advisable to have the fall pigs farrowed not later than September 15, so as to have the pigs well developed and able to stand cold weather by November. In order to have the pigs born from the first to the fifteenth of September the sow must be bred between May 10 and 25. If she is to wean her spring litter before being bred she must farrow during the latter part of March or early in April.

PROLIFICACY OF DIFFERENT BREEDS

The 1929 farrowing statement shows the Yorkshires again lead in prolificacy followed by the Tamworths and Berkshires, in order. The average Yorkshire litter farrowed in 1929 was 12·7 as compared with 10·1 for Tamworths and 9·4 for Berkshires. In the average number of pigs raised per sow, Yorkshires again lead with an average of 8·1 per sow; the Berkshires with an average of 8·0 and the Tamworths 7·2 per sow.

PROLIFICACY OF DIFFERENT BREEDS OF SWINE—SUMMARY OF YEARS 1925, 1926, 1927, 1928, 1929

—	Yorkshire	Berkshire	Tamworths
Total number of litters	137	48	75
Total number of pigs farrowed	1,555	438	643
Average number of pigs per litter	11·35	9·12	8·57
Total number of pigs raised to weaning	988	307	435
Average number of pigs weaned per sow	7·21	6·40	5·80

The above table is a summary of five years of breeding work comparing prolificacy of the Yorkshire, Berkshire and Tamworth breeds of swine. In size of litters farrowed and in average number of pigs weaned per sow the Yorkshire ranks first, the Berkshire second and the Tamworth third. As Tamworths have been raised at the Station only since 1925, only a five-year average is possible.

FEED COST OF RAISING PIGS TO WEANING AGE

Five Berkshire sows were fed during the winter of 1928-29 with the object of establishing the feed cost of raising young pigs to weaning age. All of the feed was carefully weighed from the time of service of the sows until the time the pigs were weaned at eight weeks old.

The meal ration fed during pregnancy consisted of oats, 2 parts; frosted wheat, 1 part; bone meal, 1 per cent and tankage, 8 per cent. Besides this meal ration the sows were fed sweet clover hay as roughage and had access to a mineral mixture consisting of slacked coal 76 pounds; salt, 20 pounds; air-slacked lime, 3 pounds and sulphur, 1 pound.

During the suckling period the meal ration consisted of oat chop, 2 parts; shorts, 1 part and bran, ½ part.

The following table gives a detailed analysis of the amount of feed consumed and the cost per pig:—

Feed Cost of Raising a Pig to Weaning Age

Number of sows		5
Number of pigs farrowed		44
Average number of pigs farrowed per litter		8·8
Average number of good pigs per litter		7·4
Total number of pigs weaned		39
Average number of pigs weaned per litter		7·8
Total pounds of meal consumed during gestation period		4,537
Total pounds of meal consumed during gestation period per sow		907
Total pounds of sweet clover hay consumed during gestation period		300
Total pounds of sweet clover hay consumed during gestation period per sow		60
Total pounds of mineral mixture consumed during gestation period		150
Total pounds of mineral mixture consumed during gestation period per sow		30
Total cost of feed during gestation period	$	62 99
Total cost of feed during gestation period per sow	$	12 60
Total cost of feed per litter at birth	$	12 60
Meal consumed during suckling period	lb.	3,582
Meal consumed during suckling period per sow	lb.	716
Total cost of feed during suckling period	$	53 73
Total cost of feed during suckling period per litter	$	10 75
Number of pigs weaned		39
Total cost of feed from breeding to weaning time	$	116 72
Cost of feed per sow	$	23 34
Cost of feed per pig at 8 weeks old	$	2 99

Value of Feeds

Meal Mixture—		
1 During gestation period	per ton $	27 00
2 During suckling period	per ton $	30 00
Sweet clover hay	per ton $	8 00
Mineral mixture	per 100 pounds $	0 36

A study of the above table reveals the fact that for raising a pig the total feed cost from breeding of the sow until weaning age (eight weeks) is $2.99 per pig when an average of 7·8 pigs were weaned per litter. It will be seen, therefore, that a prolific and good motherly sow is one of the great factors in economical pork production, as the cost per pig is determined to a great extent by the number of pigs weaned.

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS IN DRY LOT

In order to obtain further information relative to the value of protein and mineral supplements for growing pigs in dry lots this test has been repeated again this year.

Objects of Experiment.—1. To compare the value of buttermilk and tankage for growing pigs in dry lot.

2. To determine the value of a mineral mixture for growing pigs in dry lot.

3. To note the effect of adding minerals to the ration of pigs receiving a tankage allowance while in dry lot.

4. To determine the value of salt in the meal ration of pigs in dry lot.

EXPERIMENTAL METHODS.—Forty-eight pigs were used in this experiment comprising thirty pure-bred Yorkshires, six pure-bred Tamworths, six pure-bred Berkshires and six Berkshire-Tamworth cross-breds. These pigs were divided into six groups with eight pigs in each group. As even a distribution as possible was made with respect to age, type, sex, average weight and general thrift. Previous to the beginning of the test the feeding and management of all pigs was practically the same. All lots were self-fed the same grain ration throughout the test. In addition lot 1 received buttermilk, lot 2 tankage, lot 3 tankage and minerals, lot 4 minerals, lot 5 salt and lot 6 received the meal ration without additions. Buttermilk was fed at the rate of 100 pounds per day, tankage at the rate of 8 per cent of the meal ration, and salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain. The mineral mixture consisting of slacked coal 76 pounds; air-slacked lime 3 pounds, salt 20 pounds and sulphur 1 pound was available at all times to lots 3 and 4 from separate compartments of the self-feeders.

The pigs were confined to lots identical in area and did not have access to green feed of any kind throughout the experiment but were entirely dependent for their nourishment on the grain mixture supplied in the self-feeder. The pigs in all groups were watered twice daily, which meant that as a general rule water was before the pigs at all times. A-shaped portable cabins approximately 6 by 8 feet in size supplied shade and shelter, one of these cabins being available for each lot of ten pigs.

PROTEIN AND MINERAL SUPPLEMENTS—PROPORTION AND QUANTITIES FED

Lots	Number of hogs	Breed	Average number of days fed	How fed	Meal ration fed	Other feeds
1	8	Yorkshires, Tamworths, Berkshires and Berkshire-Tamworth cross-breds.	98·7	Self-fed.....	First 30 days— Oat chop, 1 part, barley chop, 1 part, shorts, 1 part.	Buttermilk.
					Second 30 days— Oat chop, 1 part; barley chop, 2 parts.	Buttermilk.
					To end of test— Oat chop, 1 part; barley chop, 3 parts.	Buttermilk.
2	8	Same as above.....	126·7	Same as above	Same as above.....	8 per cent tankage.
3	8	Same as above.....	119·6	Same as above	Same as above.....	8 per cent tankage plus a mineral mixture consisting of slacked coal 76 pounds; air-slacked lime 3 pounds; salt 20 pounds and sulphur 1 pound.
4	8	Same as above.....	121·7	Same as above	Same as above.....	Minerals as above.
5	8	Same as above.....	124·7	Same as above	Same as above.....	Salt mixed with the grain at the rate of 2½ pounds in 100 pounds of grain.
6	8	Same as above.....	132·0	Same as above	Same as above.....	No supplement.

The results of this test are given in the following table:—

PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS IN DRY LOT. June 19, 1929 to October 29, 1929

—	Lot 1 Buttermilk	Lot 2 Tankage	Lot 3 Tankage and minerals	Lot 4 Minerals	Lot 5 Salt	Lot 6 Meal only
Number of hogs in experiment	8	8	8	8	8	8
Initial weight, gross.....lb.	400	397	395	396	391	394
Initial weight, average..... "	50	49·6	49·4	49·5	48·9	49·2
Finished weight, gross..... "	1,666	1,434	1,546	1,508	1,456	1,135
Finished weight, average..... "	208·2	179·2	193·2	188·5	182·0	141·9
Average number of days on feed... days	98·7	126·7	119·6	121·7	124·7	132·0
Total gain per lot during test.....lb.	1,266	1,037	1,151	1,112	1,065	741
Average gain per animal for period.. "	158·2	129·6	143·9	139·0	133·1	92·6
Average daily gain per animal..... "	1·60	1·02	1·20	1·14	1·07	0·70
Amount of meal eaten by group (supplements not included)..... "	4,730	4,917	5,025	5,303	4,866	4,957
Amount of buttermilk consumed by group..... "	9,800	.....	.....	.....	.....	.....
Amount of tankage consumed by group..... "	.....	393	402	.....	.....	.....
Amount of minerals consumed by group..... "	.....	.....	846	1,124	.....	.....
Amount of salt consumed by group... "	.....	.....	.....	.....	122	.....
Cost of protein supplement per lot... $	19 60	9 82	10 05	.....	.....	.....
Cost of mineral mixture fed..... $	.....	.....	3 05	4 05	.....	.....
Cost of salt fed..... $	.....	.....	.....	.....	2 20	.....
Amount of meal eaten per pound gain.lb.	3·74	4·74	4·37	4·77	4·57	6·69
Amount of butter milk eaten per pound gain..... "	7·74	.....	.....	.....	.....	.....
Amount of tankage eaten per pound gain..... "	.....	0·38	0·35	.....	.....	.....
Amount of minerals eaten per pound gain..... "	.....	.....	0·73	1·01	.....	.....
Amount of salt eaten per pound gain.. "	.....	.....	.....	.....	0·11	.....
Total cost of feed..... $	81 93	74 58	79 26	73 83	66 30	65 28
Cost of feed per head..... $	10 24	9 32	9 91	9 23	8 29	8 16
Cost of feed per head per day.....cts.	10·37	7·36	8·29	7·58	6·65	6·18
Cost of feed to produce one pound gain "	6·47	7·19	6·89	6·64	6·22	8·81
Profit per head over cost of feed when sold at 10 cents per pound, labour neglected..... $	10 58	8 60	9 41	9 62	9 91	6 03

Prices charged for feeds—

Ground oats	50 cents a bushel
Groung barley	60 cents a bushel
Shorts	$26 a ton
Tankage	$50 a ton
Buttermilk	2 cents a gallon.
Minerals	36 cents per cwt.
Salt	$1.80 per cwt.

RESULTS.—The results obtained from this test are in some respects in accord with those obtained from a similar test conducted the previous year. The pigs receiving "grain alone" made low gains and required a comparatively large amount of grain for 100 pounds gain in weight as compared with those receiving some form of supplement in addition.

The pigs which received buttermilk in addition to the meal ration made the most gains and returned the highest net profit. The most economical gains, however, were made by the lot receiving $2\frac{1}{2}$ pounds of salt in every 100 pounds of meal mixture.

The pigs which received the meal ration without additions made the lowest daily gains and returned the least net profit.

The feeding of buttermilk at the rate of 10 gallons per day resulted in a 129 per cent increase in daily gains and a 27 per cent decrease in cost of gains.

The feeding of tankage at the rate of 8 pounds to 92 pounds of grain brought about a 46 per cent increase in daily gains and an 18 per cent decrease in cost of gains.

The use of a mineral mixture with pigs not receiving buttermilk, tankage or salt resulted in a 63 per cent increase in daily gains and a 25 per cent decrease in cost of gains.

The feeding of salt at the rate of $2\frac{1}{2}$ pounds in every 100 pounds of meal mixture resulted in a 53 per cent increase in daily gains and a 29 per cent decrease in cost of gains.

When tankage was fed there appeared to be some advantage in adding a mineral mixture to the daily menu. The rate of gain was increased by 18 per cent and the cost of gain decreased by 4 per cent.

The feeding of tankage at the rate of 8 pounds to 92 pounds of grain did not give as good results in this experiment as allowing the pigs access to a simple mineral mixture. There was a 12 per cent increase in daily gains and an 8 per cent decrease in cost of gains in the case of the mineral-fed pigs.

Yorkshire, Tamworth and Berkshire brood sows on annual fall rye and oats pasture.

Bearing out previous results, the use of a protein or mineral supplement not only resulted in higher daily gains and effected a greater saving in grain, but it had a very beneficial effect on the general health and thrift of the pigs. The pigs fed the meal ration without additions were dry in the hair, unthrifty in appearance and persisted in rooting up their lots.

A point not indicated in the table was the uneveness of maturity of the pigs fed the meal ration only. Of the sixteen pigs that were not up to 170 pounds at the close of the experiment, 7 pigs or 43·7 per cent were from the lot fed no protein or mineral supplement. The following table shows the weights according to lots.

WEIGHTS OF PIGS ACCORDING TO LOT

Lot	Under 170 pounds	Between 170 and 230 pounds
1	.....	8
2	3	5
3	1	7
4	2	6
5	3	5
6	7	1

Comparing the four protein and mineral supplement groups with lot 6 receiving grain alone, the following table is suggested:—

	Butter-milk	Tankage	Minerals	Salt
Increase in daily gain ..... lb.	0·90	0·32	0·44	0·37
Grain saved for 100 pounds gain ..... "	295	195	192	212
Grain saved by 1 pound of buttermilk, tankage, mineral or salt ..... "	0·38	5·13	1·90	19·3
Cost of 100 pounds of buttermilk, tankage, mineral or salt ..... $	0 20	2 50	0 36	1 80
Value of 100 pounds of buttermilk, tankage, mineral or salt, based on value of grain replaced ..... $	0·502	6 76	2 50	25 38
Number of times value is increased on basis of grain saved	2·51	2·70	6·94	14·1

It will be noted from the above table that on the basis of grain saved buttermilk costing 2 cents a gallon had an actual value of 5 cents a gallon, tankage costing $2.50 per hundred pounds had an actual value of $6.76 per hundred pounds, minerals costing 36 cents per hundred pounds had an actual value of $2.50 and salt costing $1.80 per hundred pounds had an actual value of $25.38 per hundred pounds.

AVERAGE OF TWO EXPERIMENTS COMPARING PROTEIN AND MINERAL SUPPLEMENTS FOR GROWING PIGS IN DRY LOT—SUMMERS 1928 AND 1929

—	Butter-milk	Tankage	Tankage and minerals	Minerals	Salt	Meal only
Number of pigs	18	18	18	18	18	18
Average initial weight ..... lb.	50·2	50·0	49·8	49·7	49·4	49·6
Average final weight ..... "	203·7	176·9	193·2	174·0	177·9	133·4
Average daily gain ..... "	1·41	1·03	1·20	1·04	1·05	0·67
Feed required for 100 pounds gain—						
Grain ..... "	481·6	553·5	485·3	603·9	577·0	846·6
Buttermilk ..... "	701·8	.....	.....	.....	.....	.....
Tankage ..... "	.....	44·1	38·8	.....	.....	.....
Minerals ..... "	.....	.....	61·1	127·5	.....	.....
Salt ..... "	.....	.....	.....	.....	14·4	.....
Cost of 100 pounds gain ..... $	8 42	9 14	8 22	9 37	8 65	12 49

Grain ration—oats, barley and shorts—
Grain prices (2 year average)—

Oats	52·5 cents a bushel
Barley	67·5 cents a bushel
Shorts	$30 a ton
Buttermilk	2 cents a gallon
Tankage	$50 a ton
Minerals	36 cents per cwt.
Salt	$1.80 per cwt.

Based on the two year average result submitted above, the following conclusions regarding protein and mineral feeding to dry lot fed pigs may be drawn:—

1. The "grain alone" ration gave rise to slow and expensive gains. The feeding of oats, barley and shorts without a supplement to pigs averaging approximately 50 pounds in weight, and over the critical weaning period when placed on test, did not prove an economical practice, as compared with the feeding of the supplemented rations.

2. The feeding of a simple mineral mixture in addition to tankage when this supplement was fed at the rate of 8 per cent of the grain ration reduced the cost of putting on 100 pounds live weight from $9.14 to $8.22 and increased the gains by 15 per cent. Tankage apparently does not carry all the mineral matter required by growing pigs in dry lot.

3. When such supplements as buttermilk and tankage are not being fed, allowing pigs free access to a simple mineral mixture or feeding salt at the rate of 2½ pounds in every 100 pounds of meal mixture materially increases the rate of gains and cuts down the cost of producing pork.

4. Buttermilk promoted the most rapid gains and the most economical gains of any of the supplements used except tankage and minerals.

5. On the basis of grain saved buttermilk costing 2 cents a gallon had an actual value of 8 cents a gallon; tankage costing $2.50 per hundred pounds had an actual value of $9.86 per hundred pounds; minerals costing 36 cents per hundred pounds had an actual value of $2.75 per hundred pounds and salt costing $1.80 per hundred pounds had an actual value of $28.55 per hundred pounds.

FROSTED WHEAT VS. BARLEY FOR FINISHING PIGS

OBJECTS OF EXPERIMENT.—1. To determine the feeding value of "feed wheat" for finishing pigs on pasture.

2. To compare feed wheat with 3 C.W. barley in feeding value.

PLAN OF EXPERIMENT.—In this experiment twelve pure-bred Yorkshire and eight pure-bred Tamworth pigs were used. In making the allotment careful consideration was given to such factors as breeding, sex, weight, condition and previous treatment. The pigs were farrowed in January and February and the average age at the beginning of the experiment was 4½ months. Each lot had access to a quarter acre pasture crop of a mixture of two bushels of oats and one bushel of fall rye spring seeded and were provided with "A"-shaped portable cabins for protection against the sun and weather. The grain ration which was self-fed consisted of frosted wheat chop to the one lot and barley chop to the other lot. Buttermilk was supplied to both lots twice daily.

METHODS OF FEEDING HOGS

Lots	Number of hogs	Average number of days on test	How fed	Meal rations fed	Other feeds
1	10	73·9	Self-fed	Frosted wheat chop	Buttermilk.
2	10	80·8	Same as lot 1	Barley chop	Same as lot 1.

Representative samples of the two feeds were taken and submitted to Dr. F. T. Shutt, Dominion Chemist, for analysis, with the following results:—

RESULTS OF ANALYSIS

——	Moisture	Protein	Fat	Carbohydrates	Fibre	Ash
Frosted wheat (feed)	10·83	14·56	3·24	66·00	3·55	1·82
Barley (3 C.W.)	11·60	10·71	2·42	69·19	3·83	2·20

Frosted Wheat.—Regarded as a good grade of feed wheat weighing well up to 60 pounds to the bushel.

Barley Chop.—A low fibre barley with rather low protein and high carbohydrates.

FROSTED WHEAT VS. BARLEY FOR FINISHING PIGS

—		Lot 1 Frosted wheat	Lot 2 Barley chop
Number of hogs in experiment		10	10
Gross weight, June 19, 1929	lb.	943	939
Average weight, June 19, 1929	"	94·3	93·9
Gross weight, September 13, 1929	"	2,018	1,958
Average weight, September 13, 1929	"	201·8	195·8
Average number of days on feed	days	73·9	80·8
Total gain per lot during test	lb.	1,075	1,019
Average gain per animal for period	"	107·5	101·9
Average daily gain per animal	"	1·45	1·26
Frosted wheat consumed at 1 cent a pound	"	4,888	.....
Barley chop consumed at 1·2 cents a pound	"	.....	5,048
Buttermilk at 2 cents per gallon	"	3,975	4,025
Cost of protein supplement per lot	$	7 95	8 05
Amount of frosted wheat eaten per pound gain	lb.	4·55	.....
Amount of barley chop eaten per pound gain	"	.....	4·95
Amount of buttermilk eaten per pound gain	"	3·70	3·95
Total cost of feed including buttermilk	$	56 83	60 58
Cost of feed per head	"	5 68	6 06
Cost of feed per head per day	cts.	7·69	7·50
Cost of feed to produce 100 pounds gain	$	5 29	5 95
Initial value per 100 pounds	"	11 00	11 00
Initial value per head	"	10 37	10 33
Selling price per 100 pounds	"	10 75	10 75
Profit per head over feed cost	"	5 64	4 66
Per bushel value of frosted wheat and barley chop when marketed through hogs at prices given below and buttermilk at price quoted above.			
12 cents per pound	$	1 48	1 09
11 cents per pound	$	1 35	0 99
10 cents per pound	$	1 22	0 89
9 cents per pound	$	1 09	0 79
8 cents per pound	$	0 96	0 70
7 cents per pound	$	0 83	0 60

An analysis of the above table reveals the fact that the lot fed frosted wheat chop made greater gains and more economical gains than the lot fed barley chop. In actual feeding value 100 pounds of wheat appeared to be equal to 109 pounds of barley.

A study of this experiment leads to the following conclusions:—

1. That pigs can be finished satisfactorily on frosted wheat as a sole grain.

2. That pigs fed frosted wheat chop made 15 per cent more rapid gains and 11 per cent more economical gains than pigs fed barley chop.

3. That placing a valuation of $11 per cwt. on the pigs at the beginning of the experiment on June 19, and valuing them at $10.75 per cwt. at the close of the experiment on September 13, the frosted wheat was marketed through hogs at $1.32 per bushel and the barley chop at $0.96 per bushel.

VALUE OF FROZEN WHEAT FOR HOG FEEDING

OBJECTS OF EXPERIMENT.—1. To determine the feeding value of frozen wheat for growing fall pigs in dry lot.

2. To compare the feeding value of frozen wheat with a mixture of equal parts oats and barley.

3. To note the effect of adding a percentage of oats to frozen wheat.

4. To compare various oat, barley and frozen wheat combinations as rations for growing and finishing hogs for market.

PLAN OF EXPERIMENT.—This experiment involved eight groups of eight pigs, allotted as uniformly as possible as to age, size, type, breed, condition and previous treatment. Each lot contained four purebred Yorkshires, three purebred Tamworths and 1 purebred Berkshire. The pigs were farrowed in August and September and the average age at the beginning of the experiment was 3¼ months. All lots were fed outside and had well banked portable cabins with openings to the south for sleeping quarters. The feeding-lots 12 feet by 24 feet adjoined each cabin which provided space for limited exercise, and the self-feeder. Water from which the chill had been removed was provided twice daily. The mineral mixture fed was: slacked coal 76 pounds; air slacked lime 3 pounds; salt 20 pounds and sulphur 1 pound.

FROZEN WHEAT PROPORTIONS AND QUANTITIES FED

Lot	Number of hogs	Breed	Number of days fed	How fed	Meal rations fed	Other feeds
1	8	Yorkshire, Tamworth and Berkshire.	103·8	Self-fed	Frozen wheat.....	8 per cent tankage
2	8	Same as above.....	106·3	"	Frozen wheat, 3 parts; oat chop, 1 part..	"
3	8	"	104·5	"	Frozen wheat, 2 parts; oat chop, 1 part..	"
4	8	"	102·5	"	Frozen wheat, 1 part; oat chop, 1 part..	"
5	8	"	102·8	"	Frozen wheat, 3 parts; oat chop, ½ part; barley chop, ½ part.	"
6	8	"	106·7	"	Frozen wheat, 2 parts, oat chop, 1 part; barley chop, 1 part.	"
7	8	"	101·3	"	Frozen wheat, 1 part; oat chop, 1 part; barley chop, 1 part.	"
8	8	"	103·8	"	Oat chop, 1 part; barley chop, 1 part.....	"

Representative samples of the three feeds were taken and submitted to Dr. F. T. Shutt, Dominion Chemist, for analysis, with the following results:—

RESULTS OF ANALYSES OF FEEDS

——	Moisture	Protein	Fat	Carbohydrates	Fibre	Ash
Oats (3C. W.) of good quality.....	9·81	9·86	6·29	61·34	9·57	3·22
Barley (3 C. W.).....	11·60	10·71	2·42	69·19	3·83	2·20
Frozen wheat (feed).....	10·83	14·56	3·24	66·00	3·55	1·82

Oat Chop.—Characterized by somewhat low protein, high fat and low fibre; a floury, mealy oat chop.

Barley chop.—A low fibre barley with a rather low protein and high carbohydrates.

Frosted wheat.—Regarded as a good grade of feed wheat weighing well up to 60 pounds to the bushel.

Tankage.—50 per cent protein.

Items		Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8
		Frozen wheat, tankage 8 per cent	Frozen wheat, 3 parts; oat chop 1 part; tankage 8 per cent	Frozen wheat, 2 parts; oat chop 1 part; tankage 8 per cent	Frozen wheat, 1 part; oat chop 1 part; tankage 8 per cent	Frozen wheat, 3 parts; oat chop ½ part; barley chop, ½ part; tankage 8 per cent	Frozen wheat, 2 parts; oat chop 1 part; barley chop, 1 part; tankage 8 per cent	Frozen wheat, 1 part; oat chop 1 part; barley chop, 1 part; tankage 8 per cent	Oat chop, 1 part; barley chop 1 part; tankage 8 per cent
Number of hogs in experiment		8	8	8	8	8	8	8	8
Initial weight, gross	lb.	527	528	527	530	521	524	524	517
Initial weight, average	"	65·9	66·0	65·9	66·3	65·1	65·5	65·5	64·6
Finished weight, gross	"	1,630	1,614	1,597	1,478	1,507	1,596	1,587	1,515
Finished weight, average	"	203·48	201·8	199·6	184·8	188·4	199·5	198·4	189·4
Average number of days on feed	days	103·8	106·3	104·5	102·5	102·8	106·7	101·3	103·8
Total gain per lot during test	lb.	1,103	1,086	1,070	948	986	1,072	1,063	998
Average gain per animal for period	"	137·9	135·8	133·8	118·5	123·2	134·0	132·9	124·8
Average daily gain per animal	"	1·33	1·28	1·28	1·16	1·20	1·26	1·31	1·20
Frozen wheat consumed at 1 cent per pound	"	4,857	3,457	2,767	1,984	3,405	2,343	1,472	.....
Oat chop consumed at 1·4 cents per pound	"	.....	1,152	1,384	1,983	567	1,171	1,472	2,158
Barley chop consumed at 1·2 cents per pound	"	.....	.....	.....	.....	567	1,171	1,472	2,158
Tankage at $2.50 per hundred	"	388	369	332	317	363	375	353	345
Mineral mixture at 36 cents per 100 pounds	"	301	401	254	275	301	377	374	275
Amount of meal eaten by group (tankage not included)	"	4,857	4,609	4,151	3,967	4,539	4,685	4,416	4,316
Cost of protein supplement per lot	$	9 70	9 23	8·30	7 93	9 08	9 38	8 83	8 63
Cost of mineral mixture per lot	$	1 08	1 44	0 91	0 99	1 08	1 36	1 35	0 99
Amount of meal eaten per pound gain	lb.	4·40	4·24	3·88	4·18	4·60	4·37	4·15	4·32
Amount of frozen wheat eaten per pound gain	"	4·40	3·18	2·59	2·09	3·45	2·19	1·38	.....
Amount of oat chop eaten per pound gain	"	.....	1·06	1·29	2·09	0·58	1·09	1·38	2·16
Amount of barley chop eaten per pound gain	"	.....	.....	.....	.....	0·58	1·09	1·38	2·16
Amount of tankage eaten per pound gain	"	0·35	0·34	0·31	0·33	0·37	0·35	0·33	0·35
Amount of minerals eaten per pound gain	"	0·27	0·37	0·24	0·29	0·31	0·35	0·35	0·28
Total cost of feed including tankage and minerals	$	59 35	61 37	56 26	56 52	58 95	64 61	63 17	65 73
Cost of feed per head	$	7 42	7 67	7 03	7 07	7 37	8 08	7 90	8 22
Cost of feed per head per day	cts.	7·15	7·22	6·73	6·90	7·17	7·57	7·80	7·92
Cost of feed to produce one pound gain	"	5·38	5·65	5·26	5·96	5·98	6·03	5·94	6·59
Initial value per pound	"	8·50	8·50	8·50	8·50	8·50	8·50	8·50	8·50
Initial value per head	$	5 60	5 61	5 60	5 63	5 54	5 57	5 57	5 49
Selling price per pound	cts.	11·00	11·00	11·00	11·00	11·00	11·00	11·00	11·00
Profit per head over feed cost	$	9 39	8 91	9 33	7 62	7 81	8 30	8 35	7 12

Per bushel value of frozen wheat when marketed through hogs at prices given below and oats, barley, tankage and minerals at prices quoted above.								
12 cents per pound	$	1 50	1 80	2 16	2 33	1 65	2 24	3 22
11 cents per pound	$	1 37	1 61	1 93	2 04	1 47	1 97	2 79
10 cents per pound	$	1 23	1 42	1 70	1 76	1 30	1 69	2 36
9 cents per pound	$	1 09	1 23	1 47	1 47	1 12	1 42	1 93
8 cents per pound	$	0 96	1 04	1 24	1 18	0 95	1 14	1 49
7 cents per pound	$	0 82	0 85	1 00	0 90	0 78	0 87	1 06

SUMMARY.—Lot 1 which received frozen wheat made the largest gains and returned the highest net profit.

Lot 8 which received a mixture of equal parts of oat and barley chop returned the least net profit.

A comparison of lot 1 fed straight wheat with the average of the results of lots 2, 3 and 4 getting oat chop in various amounts from 25 per cent of the meal ration to 50 per cent shows the frozen wheat group to make 0·09 of a pound higher daily gains and to produce these gains at a cost of 0·24 of a cent less per pound than the average of the lots with oat chop. Of the three lots getting oat chop in various amounts the most economical gains were made by the hogs getting the 33·3 per cent ration of oat chop.

A comparison of lot 1 fed straight wheat with the average of the results of lots 5, 6, 7 and 8 getting oat and barley chop in various amounts from 12½ per cent of the meal ration to 100 per cent shows the frozen wheat group to make 0·09 of a pound higher daily gains and to produce these gains at a cost of 0·76 of a cent less per pound than the average of the lots with oat and barley chop.

In comparing lot 2 with lot 5 it will be seen that the lot receiving 25 per cent of the meal ration as oat chop made 0·08 of a pound higher daily gains and produced these gains at a cost of 0·33 of a cent less per pound than the lot fed 25 per cent of the meal ration as oat and barley chop.

In comparing lot 2 with lot 6 it will be seen that the lot receiving 25 per cent of the meal ration as oat chop made 0·02 of a pound higher daily gains and produced these gains at a cost of 0·38 of a cent less per pound than the lot fed a 50-50 supplement of oats and barley.

A comparison of lots 3 and 7 shows that the lot fed 33·3 per cent of the meal ration as oat chop made slightly lower daily gains but produced their gains at a cost of 0·68 cents less per pound than the lot fed 66·6 per cent of the meal ration as oat and barley chop.

A comparison of lots 4 and 8 shows that the lot receiving the mixture of equal parts of frosted wheat and oat chop made slightly lower daily gains but produced their gains at a cost of 0·63 of a cent less per pound than the lot fed the mixture of equal parts of oat and barley chop.

The outstanding factor in this experiment is the rapidity and economy of gains which it is possible to make when straight frozen wheat, supplemented with tankage, is fed to fall pigs.

When oats or a mixture of oats and barley were added in various amounts to frozen wheat the average daily gain showed a tendency to decrease. On the other hand, the feed requirement for a pound of gain was on the average lower where oats or a mixture of oats and barley in various amounts were fed as a supplement to frozen wheat. The lower meal consumption per pound of gain, however, was not sufficiently small to counterbalance the 0·4 of a cent a pound higher cost of the oat chop and the 0·2 of a cent a pound higher cost of the barley chop as compared with the cost per pound of the frozen wheat.

The lot fed frozen wheat alone made more rapid and more economical gains than pigs fed oats and barley half and half.

A study of this experiment leads to the following conclusions:—

1. That fall pigs can be grown and finished satisfactorily on frozen wheat as a sole grain.

2. That the addition of oats and a mixture of oats and barley in various amounts from 25 per cent of the meal ration to 66·6 per cent reduced the gains and decreased the economy of gains. Oats did not seem to be necessary to overcome the so-called "gummy" tendency of the wheat.

3. That pigs fed frozen wheat alone made 11 per cent more rapid gains and 18 per cent more economical gains than pigs fed oats and barley half and half.

4. That when the market price of hogs is 11 cents per pound, tankage is worth $50 per ton and a mineral mixture is worth 36 cents per one hundred pounds, frozen wheat may be marketed through hogs at $1.37 per bushel. As the market price of hogs increased or decreases the hog market value of frozen wheat would vary as follows:—

When hogs are worth—	Frozen wheat may be marketed at
12 cents per pound	$1 50
11 cents per pound	1 37
10 cents per pound	1 23
9 cents per pound	1 09
8 cents per pound	0 96
7 cents per pound	0 82

ADVANCED REGISTRATION OF SWINE

Although the policy of the Advanced Registry for Purebred Swine was tried out on the Dominion Experimental Farms in 1928, it was not until early in the year 1929 that the policy was placed upon an official basis under the administration of an officer of the Dominion Live Stock Branch. It is not the intention here to elaborate the rules and regulations governing the policy, other than to state that its objects are to collect data on the breeding qualities of sows and boars through the feeding and slaughter test of their progeny, to systematize this information into a permanent official record and in this way to make available information as to the merits of a registered sow and her offspring in the same way as information can be at present obtained as to the merits of registered dairy cattle. It is expected that as the policy becomes generally applied it will eliminate the use of inferior breeding stock in our purebred herds.

The policy proposed by the Advanced Registry Board is largely in the nature of an experiment and has at the present time no fixed standard, the records for this year's work being required to complete a workable system for the Advanced Registration of Swine. The combined data indicating the results of this work to date on the different Experimental and Institutional Farms is being prepared and will probably be issued in pamphlet form at an early date by the Dominion Live Stock Branch.

Continuing the work started in 1928 when eleven litters were under test, fifteen litters comprising eight purebred Yorkshires, four purebred Tamworths and three purebred Berkshires ranging in numbers from six to twelve pigs per litter were entered in this scheme in the spring of 1929. The complete litters were included in the experimental project although the scheme called for five pigs from each litter only, four of which were to be used for slaughter. One pig was carried more or less as a spare in case of some accident to one of the pigs if only four were kept. The five pigs were nominated from each litter entered at the time of the Inspector's visit, and were fed with the other pigs in the litter, up to market weights of 190 to 230 pounds. The Inspector weighed the individual pigs in each litter when they were from four to eight weeks of age before weaning and at the same time tattooed all hogs according to the plan set out in the policy. When each of four pigs nominated from each litter reached their proper development they were shipped by express to Swifts Abattoir at Edmonton for the slaughter test. This test designed to ascertain the more desirable carcasses for the home and export trade, furnishes one of the most accurate guides available in measuring the worth of breeding stock.

Each litter during the test had access to one-third of an acre of brome pasture and a cabin for shelter. All grain was ground and fed dry in a trough twice daily. A small quantity of buttermilk was supplied to each litter daily in a separate trough as well as all the water they wished to drink.

WEIGHTS

The individual hogs in each litter were weighed when the pigs were weaned and put on test, at the end of each 30-day period and at the termination of the experiment.

All feeds consumed were carefully and accurately weighed.

PLAN OF EXPERIMENT

Lot No.	Breed	Number of pigs	Number of days in experiment	How fed	Meal ration fed and cost per cwt.	Other feed
1	Yorkshire	12	149·1	Trough	First 60 days. Oat chop, 200 pounds. Barley chop, 100 pounds. Shorts, 100 pounds. Salt, 2 pounds. Cost per hundred pounds, $1.39. 60 to 90 days. Oat chop, 100 pounds. Barley chop, 100 pounds. Shorts, 100 pounds. Salt, 2 pounds. Cost per hundred pounds, $1.35. 90 days to finish. Oat chop, 100 pounds. Barley chop, 200 pounds. Salt, 2 pounds. Cost per hundred pounds, $1.33.	Buttermilk. Cost per hundred pounds 20 cents.
2	Yorkshire	6	143·0	Trough	Same as above	Same as above.
3	Yorkshire	9	141·9	Trough	Same as above	Same as above.
4	Yorkshire	9	138·4	Trough	Same as above	Same as above.
5	Yorkshire	8	143·1	Trough	Same as above	Same as above.
6	Yorkshire	11	154·1	Trough	Same as above	Same as above.
7	Yorkshire	10	147·3	Trough	Same as above	Same as above.
8	Yorkshire	10	168·4	Trough	Same as above	Same as above.
9	Tamworth	8	156·1	Trough	Same as above	Same as above.
10	Tamworth	7	153·6	Trough	Same as above	Same as above.
11	Tamworth	6	151·3	Trough	Same as above	Same as above.
12	Tamworth	7	152·4	Trough	Same as above	Same as above.
13	Berkshire	8	145·6	Trough	Same as above	Same as above.
14	Berkshire	10	157·1	Trough	Same as above	Same as above.
15	Berkshire	8	143·6	Trough	Same as above	Same as above.

Representative samples of the feeds used were taken and submitted to Dr. F. T. Shutt, Dominion Chemist for analysis, with the following results:—

RESULTS OF ANALYSES OF FEEDS

Constituent	Moisture	Protein	Fat	Carbo-hydrates	Fibre	Ash
Shorts "Spigmil"	11·33	17·85	5·40	57·09	4·94	3·39
Barley chop 3 C.W.	10·79	10·93	2·67	68·09	5·18	2·34
Oat chop 3 C. W.	9·71	8·78	5·93	62·45	9·85	3·28

The following table is a statement of the cost of production of each of the fifteen litters included in the Advanced Registration scheme for swine in 1929, together with the amount of feed consumed, cost of feed per pound of pork produced and profit over feed.

The profit column shows a comparison only between cost of feed and value of pork produced. The cost of the labour and interest on the investment are not included. No charge was made for pasture.

Lot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average:
Sow No.	1	19	18	9	25	12	21	3	16	2	14	10	20	8	10	15
Breed	York-shire	York-shire	York-shire	York-shire	York-shire	York-shire	York-shire	York-shire	Tam-worth	Tam-worth	Tam-worth	Tam-worth	Berk-shire	Berk-shire	Berk-shire	litters
Number of pigs	12	6	9	9	8	11	10	10	8	7	6	7	8	10	8	8·6
Date farrowed	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	1929	.....
Date weaned and placed on test	Jan. 5 1929	Feb. 7 1929	Mar. 2 1929	Mar. 12 1929	April 15 1929	April 18 1929	April 20 1929	May 1 1929	Feb. 8 1929	Feb. 9 1929	Mar. 17 1929	April 10 1929	Feb. 4 1929	April 25 1929	May 1 1929	.....
Number of days from birth to weaning	Mar. 4 58	April 1 53	May 1 60	May 6 55	June 10 56	June 12 55	June 15 56	June 22 52	April 1 52	Mar. 30 49	May 11 55	June 5 56	Mar. 26 51	June 20 56	June 22 52	..... 54·4
Date of test	1929 Aug. 16	1929 Aug. 26	1929 Spet. 23	1929 Sept. 23	1929 Nov. 12	1929 Dec. 9	1929 Nov. 12	1929 Dec. 16	1929 Sept. 16	1929 Sept. 3	1929 Oct. 14	1929 Nov. 12	1929 Aug. 19	1929 Dec. 2	1929 Nov. 19	
Average number of days on feed	149·1	143·0	141·9	138·4	143·1	154·1	147·3	168·4	156·1	153·6	151·3	152·4	145·6	157·1	143·6	149·7
Average number of days from birth to slaughter	207·1	196·0	201·9	193·4	199·1	209·1	203·3	220·4	208·1	202·6	206·3	208·4	196·6	213·1	195·6	204·1
Total initial weight at weaning lb.	371	135	264	227	227	271	250	244	153	172	143	171	154	238	208	215·2
Average initial weight at weaning "	30·9	22·5	29·3	25·2	28·4	24·6	25·0	24·4	19·1	24·6	23·8	24·4	19·2	23·8	26·0	25·0
Total finished weight at Farm "	2,527	1,219	1,846	1,774	1,806	2,353	2,035	2,062	1,566	1,301	1,272	1,416	1,564	1,973	1,665	1,758·6
Average finished weight at Farm "	210·6	203·2	205·1	197·1	225·7	213·9	203·5	206·2	195·7	185·9	212·0	202·3	195·5	197·3	208·1	204·5
Total gain "	2,156	1,084	1,582	1,547	1,579	2,082	1,785	1,818	1,413	1,129	1,129	1,245	1,410	1,735	1,457	1,543·4
Average gain per hog from weaning "	179·7	180·7	175·8	171·9	197·4	189·3	178·5	181·8	176·6	161·3	188·2	177·9	176·2	173·5	182·1	179·5
Average daily gain per hog from weaning "	1·21	1·26	1·24	1·24	1·38	1·23	1·21	1·08	1·13	1·05	1·24	1·17	1·21	1·10	1·27	1·20
Total meal consumed "	9,036	3,963	5,156	5,055	5,483	7,447	6,495	7,634	5,456	4,378	4,350	4,886	5,008	6,453	5,503	5,753·5
Total buttermilk consumed "	8,875	6,352	5,950	6,250	6,475	7,725	6,375	6,900	6,575	6,460	7,000	6,675	5,950	6,775	6,625	6,729·0
Pounds meal eaten per pound of gain "	4·19	3·66	3·26	3·27	3·47	3·58	3·64	4·20	3·86	3·88	3·85	3·92	3·55	3·72	3·78	3·73
Pounds buttermilk eaten per pound of gain "	4·12	5·83	3·76	4·04	4·10	3·23	3·57	3·79	4·65	5·72	6·20	5·36	4·22	3·90	4·55	4·36
Total cost of feed including buttermilk $	139 61	66 20	81 52	80 75	86 78	115 58	100 16	116 34	86 80	72 06	72 75	79 16	79 52	100 40	87 47	91 01
Cost of feed per head $	11 63	11 03	9 06	8 97	10 85	10 51	10 02	11 63	10 85	10 29	12 12	11 31	9 94	10 05	10 93	10 58
Cost of feed per pound gain cts.	6·48	6·11	5·15	5·25	5·50	5·55	5·61	6·40	6·14	6·38	6·44	6·36	5·64	5·79	6·00	5·90
Profits per head at 10 cents per pound less cost of feed $	9 42	9 28	11 45	10 74	11 73	10 88	10 33	8 99	8 72	8 29	9 07	8 92	9 61	9 69	9 88	9 80

Remarks.—A study of the above table reveals the fact that in the fifteen litters tested there was a wide variation in the amount of feed required to produce 100 pounds of pork. The best litter required 326 pounds of grain and the poorest 425 pounds. The time taken to bring the pigs to market weight varied from 193·4 to 220·4 days. The average daily gain per hog from weaning to slaughter varied from 1·05 to 1·38 pounds. Thus it would seem that there are certain strains of swine which will produce hogs of market weights much more economically and at an earlier age than the pigs of other strains. The effort of the Advanced Registry work is to ascertain and record the profitable strains and discard the unprofitable strains.

The average for the 15 litters shows the pounds of meal eaten per 100 pounds gain to be 373 pounds; the time taken to bring the pigs to market weight to be 204·1 days and the daily gain per hog from weaning to slaughter to be 1·20 pounds.

FIELD HUSBANDRY

The results of experiments with cultural methods, fertilizers and farm rotations are reported under this Division.

In reviewing this work it is well for the reader to keep in mind that the land on which the experiments were conducted is a dark friable loam and that the annual precipitation averages slightly over seventeen inches. Approximately sixty per cent of the precipitation usually occurs during the growing season.

CROP ROTATIONS

Fifteen rotations are under test at the present time. Accurate cost of production figures are kept in these experiments. The actual time required for the different field operations as well as the amount of seed, twine, manure, etc., is recorded. These, along with land rental, and use of machinery rental, are charged against the crop produced, while the crop produced is credited with the value it would realize if placed on the market during the regular marketing season.

The following values are used in computing the cost of production in the rotation experiments:—

Cost Values

Rent per acre	$ 4 00
Manure per ton	1 00
Wheat per bushel	1 25
Barley per bushel	0 60
Oats per bushel	0 50
Fall rye per bushel	0 90
Corn per bushel	3 00
Potatoes per bushel	1 00
Mangold seed per pound	0 70
Sunflowers per hundred pounds	13 00
Timothy per hondred pounds	14 00
Sweet clover per hundred pounds	13 00
Alfalfa per hundred pounds	35 00
Alsike per hundred pounds	20 00
Rye grass per hundred pounds	13 00
Brome grass per hundred pounds	13 00
Red clover per hundred pounds (Alt swede)	35 00
Machinery per acre	1 35
Tractor per hour	1 00
Silo filling machinery per ton	0 25
Manual labour per hour	0 30
Horse labour per hour	0 08
Binder twine per hundred pounds	14 00
Threshing per bushel—wheat and rye	0 10
barley	0 08
oats	0 06

RETURN VALUES

Wheat per bushel	$ 1 28
Barley per bushel	0 54
Oats per bushel	0 54
Winter rye per bushel	0 86
Sweet clover per ton	12 00
Alfalfa per ton	18 00
Mixed hay per ton	15 00
Green feed per ton	10 00
Timothy per ton	18 00
Straw per ton	2 00
Ensilage per ton	4 00
Potatoes per ton	50 00
Roots per ton	5 00

The following explanation of the above cost and return values may be of interest:—

All cost of production figures are reduced to the basis of one acre, although the size of the blocks varies from one to forty acres.

RENT.—The amount of rent is obtained by charging the value of the land with the current rate of interest as obtained on first mortgages; to this is added the amount of taxes per acre.

MANURE.—The charge for manure covers only the cost of applying the manure to the land, and does not include any additional value it may have. The data available at present indicate that it is doubtful if the direct profits from the application of barnyard manure more than compensate for the expense of applying it. The cost of applying the manure is distributed equally among all the crops in the rotation.

MANUAL LABOUR.—The rate for manual labour is an average of the prevailing summer wages for hired help in the district. The number of hours charged against a crop includes only that required to complete the work under average farm conditions, and includes all work required in the growing, harvesting and storing of the crop.

HORSE LABOUR.—The rate for horse labour includes the cost of feed, the interest on the value of the horse, the depreciation in the value of the horse and harness, as well as the value of the manual labour required to care for the horse.

MACHINERY.—The charge for farm machinery, was established to cover the interest and depreciation on the machinery used on an average farm. Where a tractor is used, a rate per hour is charged to cover depreciation and interest on investment in tractor used. Where silo-filling machinery is used, the charge per ton for cutting the ensilage is sufficient to cover the rental of the machinery.

THRESHING.—The charge per bushel for threshing covers the total cost incurred from stook to granary, and is representative of the prices charged on custom work in the district.

GRASS AND CLOVER SEED.—The grass and clover seeding, when it does not fail, is distributed equally to each hay and pasture year in the rotation; when it does fail and there is no hay crop, the charge is made against the whole rotation and not against any one crop.

SUMMER-FALLOW.—The charges against the summer-fallow include rent, machinery and labour. The first crop following summer-fallow is charged with two-thirds of the cost of summer-fallowing, while the second crop is charged with one-third of the cost.

ENSILAGE.—Ensilage is given a value on the basis of 300 pounds of silage in the silo being equal to 100 pounds of hay in the mow or stack.

ROOTS.—Owing to their varying feeding value when fed in different amounts and to different kinds of animals, an arbitrary value is given. This value is based on the cost of production and observations during actual feeding tests.

MISCELLANEOUS.—The cost values of seeds, twine, oil, etc., are the actual values for the year in the district for the class of material used. The return values which are used are market prices on November 1.

ROTATION "O"

First year—Hoed crop, potatoes.

Second year—Wheat.

Third year—Oats.

Fourth year—Summer-fallow.

Fifth year—Wheat, seeded with 10 pounds alfalfa and 10 pounds western rye grass per acre.

Sixth year—Hay manured with 15 tons per acre after harvest.

Seventh year—Hay, broken early after harvest and cultivated for the balance of the season.

ROTATION "O"—7 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		bush.	bush.	$	$	$	$
1	Hoed crop, potatoes (10 years)	87·33	205·66	131 00	58 61	72 39	52 74
2	Wheat (18 years)	18·6	34·2	25 55	13 70	11 85	20 86
3	Oats (18 years)	27·0	56·2	15 28	14 24	1 04	11 85
4	Summer-fallow	.....	.....	.....	.....	.....	−9 23
5	Wheat (7 years)	16·1 tons	26·2 tons	21 27	23 12	−1 85	9 09
6	Hay (summer-fallow replacing hay) (16 years)	.....	1 47	.....	17 36	−17 36	4 46
7	Hay (7 years)	0·29	1·16	4 35	11 27	−6 92	2 77
	Totals for rotation	.....	.....	197 45	138 30	59 15	92 54
	Average per acre	.....	.....	28 21	19 76	8 45	13 22

Rotation "O" produced an average profit per acre of $8.45 in 1929 and $13.22 since it was started.

Rotation "O" is a mixed farming rotation suitable for most districts in the park belt of Alberta in a year with normal precipitation. The exceptionally low yields and profits per acre produced in 1929 are far from satisfactory and indicate that this rotation might not be suitable for use in districts where the annual precipitation is less than the average received at Lacombe. Had it not been for the exceptionally high price of potatoes in 1929 the results obtained would have been even more discouraging.

It is interesting to note that wheat following the intertilled crop of potatoes exceeded the wheat following summer-fallow both in yield and profit per acre produced. One can easily understand the difference in the profit per acre as the wheat following intertilled crop has no charge against the crop for the preparation of the land while that following summer-fallow has to meet a portion of the cost of fallowing.

The difference in yield favouring the crop following the intertilled crop is not so easily explained. Apparently in this case moisture was not the limiting factor in crop production. Had moisture been the limiting factor the wheat

following summer-fallow would have outyielded the wheat following the intertilled crop. The most reasonable explanation would seem to be that the organic matter in the soil, resulting from the decomposition of the legume and grass sod, as well as the barnyard manure applied for the potato crop, was not all utilized by the potato crop, a portion of it being available for the succeeding wheat crop. This organic matter may have functioned in two ways for the improvement of the yields of the wheat; first, by supplying or rendering available fertilizing elements lacking in the summer-fallowed land, and second, the organic matter in the soil may have retained soil moisture more efficiently or made it possible for the crop to use the limited moisture available to better advantage.

The potato crop, as will be noted, was only about one-third of a crop. The high price of potatoes, as a result of a general shortage throughout the country, together with the lower cost of producing and handling a light crop in a dry season, tended to make this crop even more profitable than usual.

Hay yields were very disappointing. The new seeding, although a fair stand, made no growth whatever and had to be ploughed down to check weed growth. The second year hay produced a very light crop but was well established and thus checked the growth of weeds which developed on the new seeding.

ROTATION "K"

First year— Hoed crop, corn.

Second year—Wheat.

Third year—Barley, seeded down with 10 pounds alfalfa and 10 pounds western rye grass per acre.

Fourth year—Hay, manured 15 tons per acre after harvest.

Fifth year—Hay.

Sixth year—Hay, broken early in August and cultivated for balance of season.

ROTATION "K"—6 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		tons	tons	$	$	$	$
1	Corn (9 years)	5·52	7·14	22 08	21 23	0 85	8 10
		bush.	bush.				
2	Wheat (18 years)	30·8	30·0	42 28	17 03	25 25	15 67
3	Barley (18 years)	32·2	31·3	19 57	16 04	3 53	5 29
		tons	tons				
4	Hay (17 years)	0·84	1·36	1 68	10 78	−9 10	4 87
5	Hay (8 years)	2·29	1·76	34 35	14 61	19 74	10 32
6	Hay (7 years)	0·70	1·18	10 50	11 11	−0 61	5 22
	Totals for rotation	.....	.....	130 46	90 80	39 66	49 47
	Average per acre	.....	.....	21 74	15 13	6 61	8 24

Rotation "K" produced an average profit per acre of $8.24 since it was started, and $6.61 for the year 1929.

The wheat in this rotation followed an intertilled crop and as was the case where wheat followed an intertilled crop in Rotation "O" gave an unusual yield and profit per acre. This is further proof that some factor other than moisture is influencing the yield per acre.

The barley yield is fair but because of the low prevailing price of barley, does not show as much profit per acre as it should.

The first cutting of hay was a disappointment, consisting largely of rubbish and being fit for bedding only. The second year's cutting gave a fair crop of excellent hay from the two cuttings. The third year hay yields were relatively low as only one cutting was taken, the sod being ploughed after the first cutting was made. As a whole, the hay crop was rather disappointing although an average of slightly over one ton per acre over the three years was a fair crop when the very dry season was taken into consideration.

Rotation "K" is not a very satisfactory rotation for dry years; hence it seems reasonable to assume that it would not be very satisfactory for dry districts.

ROTATION "C"

First year—Summer-fallow.

Second year—Wheat.

Third year—Wheat.

ROTATION C"—3 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average 16 years			1929	Average 16 years
		bush.	bush.	$	$	$	$
1	Summer-fallow						* −8 59
2	Wheat	9·6	30·2	13 31	20 64	−7 33	16 35
3	Wheat	7·7	18·7	10 51	15 42	−4 91	.8 95
	Totals for rotation			23 82	36 06	−12 24	16 71
	Average per acre			7 94	12 02	−4 08	5 57

*17 year average.

Rotation "C" made a loss of $4.08 in 1929, and a profit of $5.57 during the past sixteen years.

It will be noted that neither the first nor second year following summer-fallow showed a profit. In considering these figures it should be remembered that two-thirds of the cost of summer-fallowing is charged against the first year wheat and one-third against the second year wheat following summer-fallow.

Rotation "C" has given fairly good satisfaction while the land was comparatively new and free from weeds, etc. It is a rotation frequently followed in the grain growing districts of Central Alberta. This season's results indicate that it is not a dependable or profitable rotation for districts with precipitation more limited than that which obtains at Lacombe.

ROTATION "LACOMBE"

First year—Hoed crop, sunflowers.

Second year—Wheat, seeded with 10 pounds western rye and 10 pounds sweet clover per acre.

Third year—Hay.

Fourth year—Hay, broken after harvest.

Fifth year—Oat greenfeed, stubble fall-ploughed and rotted manure applied 10 tons per acre during the winter.

ROTATION LACOMBE"—5 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		tons	tons	$	$	$	$
1	Sunflowers (7 years)	6·20	12·89	24 80	19 49	5 31	22 86
		bush.	bush.				
2	Wheat (6 years)	16·0	36·1	21 98	12 74	9 24	21 08
		tons	tons				
3	Hay (6 years)	1·00	1·78	2 00	9 94	−7 94	9 33
4	Hay (5 years)	1·25	1·95	18 75	11 19	7 56	15 90
5	Oat greenfeed (6 years)	1·48	2·11	14 80	17 69	−2 89	−0 60
	Totals for rotation	.....	.....	82 33	71 05	11 28	68 57
	Average per acre	.....	.....	16 47	14 21	2 26	13 71

Rotation "Lacombe" produced an average profit per acre of $2.26 in 1929, and $13.71 during the past six years.

This rotation is essentially a live stock rotation, and like most live stock rotations was not particularly satisfactory in a dry season. Wheat following sunflowers produced an average of 16·0 bushels per acre and, because of the low cost of producing wheat where the crop follows an intertilled crop, gave an average profit of $9.24 per acre. The first year hay, as was the case in all new seeding, was almost a complete failure. The stand was fair but the growth produced by the young grass and legume plants was almost negligible, a high percentage of the resulting crop consisting of stubble and trash. The second year hay crop, while low in yield was excellent in quality.

The oat greenfeed crop yielded less than one-half of the average yield for the past six years. The crop was very short but of excellent quality.

The sweet clover in the hay mixture winter-killed during the past winter. This is further evidence that sweet clover is not wholly satisfactory as a winter legume. Experience has shown that it winter-kills at least 50 per cent of the time, and that it is much more subject to winter-killing than alfalfa.

ROTATION "H"

First year—Wheat stubble spring-ploughed.

Second year—Oats.

Third year—Summer-fallow.

Fourth year—Wheat, seeded with 10 pounds alfalfa and 10 pounds western rye per acre.

Fifth year—Hay, 15 tons rotted manure applied in winter and harrowed in the spring.

Sixth year—Hay, broken after harvest.

ROTATION "H"—6 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		bush.	bush.	$	$	$	$
1	Wheat (7 years)	23·2	26·0	31 28	19 58	11 70	11 84
2	Oats (7 years)	13·7	39·8	7 76	13 08	−5 32	3 96
3	Summer-fallow (7 years)	.....	.....	.....	.....	.....	−9 95
4	Wheat (7 years)	23·7	30·0	32 56	26 17	6 39	14 34
		tons	tons				
5a	Hay (5 years) western rye and alfalfa	0·79	1·71	11 85	15 44	−3 59	6 79
5b	Hay (1st year) western rye	0·63	0·63	9 45	13 82	−4 37	−4 37
6	Hay (5 years) western rye and alfalfa	0·43	1·51	6 45	12 21	−5 76	6 52
	Totals for rotation	.....	.....	88 70	85 67	3 03	29 13
	Average per acre	.....	.....	14 78	14 28	0 50	4 16

Rotation " H " is a mixed farming rotation which showed a profit of only 50 cents per acre in 1929, and an average of $4.16 during the period it has been under test.

It will be observed that the two wheat crops in the first and fourth years were the only profitable crops in the rotation. It is of interest that the wheat on western rye grass and alfalfa sod yielded nearly as well and was much more profitable than that following the summer-fallow.

Hay and oats, as was typical of the district, gave relatively low yields and very small returns.

ROTATION " INTERTILLED "

First year—Wheat.

Second year—Wheat, stubble to be spring ploughed.

Third year—Wheat, half intertilled and half seeded 3 pecks per acre.

Rotation " Intertilled " is a rotation designed to compare the production of grain seeded in rows against wheat seeded thinly and also to provide a comparison of this rotation against Rotation " C " where the summer-fallow is used as a preparation for wheat. The use of intertilled grain as a preparation has not proven satisfactory.

When this rotation was started oats were used as the intertilled crop. It was found that the volunteer oats among the succeeding wheat crop reduced the value materially as a result of a heavy dockage. In some cases there was sufficient oats to throw the grain into the feed grade.

The weed problem was much more serious than the mixing of grains which was corrected by using wheat of the same variety as an intertilled crop.

When the rotation was started in 1923 there was an occasional wild oat in the land, possibly one half dozen plants per acre. These few plants appeared to increase at an alarming rate and in places increased to such an extent that they completely smothered the wheat crop of 1929.

The season of 1929 was very dry and a normal seeding of wheat made a very limited growth. A thick mat of wild oat seedlings scattered throughout the crop, made it resemble a lawn more than a wheat crop. Since the wild oat infestation was increasing from year to year, and since continuous wheat production without a summer-fallow or cleaning crop of any kind did not permit cultural practices that would control the wild oats, it was deemed advisable to discontinue the rotation and the potential wheat crop, consisting of at least fifty per cent wild oats, was ploughed up when the crop came in head when about eight or ten inches high.

ROTATION "SWEET CLOVER"

First year—Wheat, fall-plough stubble.
Second year—Wheat, seeded with biennial sweet clover.
Third year—Hay, sweet clover stubble fall-ploughed.

ROTATION "SWEET CLOVER"—3 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		bush.	bush.	$	$	$	$
1	Wheat (7 years)	21·3	31·2	29 26	17 25	12 01	16 65
2	Wheat (7 years)	12·0	27·3	16 48	11 73	4 75	14 09
3	Sweet clover hay (5 years) tons	0·82	1·52	9 84	9 23	0 61	3 61
	Totals for rotation	.....	.....	55 58	38 21	17 37	34 35
	Average per acre	.....	.....	18 53	12 74	5 79	11 45

Rotation "Sweet Clover" produced an average profit per acre of $5.79 in 1929 and $11.45 per acre during the period this rotation has been in progress.

Sweet clover appears to be fitting in particularly well as a summer-fallow substitute and is largely responsible for the profitable returns from this rotation. The first year wheat following sweet clover was one of the most productive and profitable wheat crops grown at the Station.

The difference in the yield of the first and second year wheat following sweet clover is difficult to explain. It is rather doubtful if the difference in the date of fall ploughing for the two crops would affect the yields to such an extent, as this would not influence to any appreciable extent the amount of moisture stored. It would seem likely that the decaying sweet clover roots influenced the physical condition of the soil in such a way that the crop was able to make more effective use of the limited moisture available. It is also possible that the plant food liberated as a result of the decomposition of the organic matter may have stimulated a maximum growth with the amount of moisture available; and that this plant food was largely utilized by the first year crop following sweet clover, very little being left for the second crop.

ROTATION "MANITOBA"

First year—Wheat.
Second year—Wheat stubbled in.
Third year—Oats, on spring ploughing.
Fourth year—Summer-fallow.

ROTATION "MANITOBA"—4 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average 7 years			1929	Average 7 years
		bush.	bush.	$	$	$	$
1	Wheat	21·0	33·0	28 86	21 58	7 28	19 95
2	Wheat	12·0	25·5	16 48	13 94	2 54	13 51
3	Oats	42·0	49·4	23 78	12 56	11 22	8 96
4	Summer-fallow	.....	.....	.....	.....	.....	−9 35
	Totals for rotation	.....	.....	69 12	48 08	21 04	33 07
	Average per acre	.....	.....	17 28	12 02	5 26	8 27

Rotation "Manitoba" made an average profit per acre of $5.26 in 1929 and $8.27 during the past seven years.

This rotation proved more profitable in 1929 than many of the others tested at the Station. This may be explained by the fact that the location of the land on which this rotation is located gave it an advantage in a dry year such as 1929.

While this rotation has given very satisfactory returns to date, it is anticipated that trouble will eventually be met with in controlling weeds, and in the maintenance of fertility and organic matter in the soil.

This rotation would be very satisfactory for grain growing districts where the precipitation is equal to or exceeds that of Lacombe. It would be most satisfactory while the land is new and reasonably free from weed seeds. Doubtless it would eventually be replaced in such districts by mixed farming rotations when the soil and organic matter of the soil became depleted and when the land became polluted with weeds which can be most economically controlled with forage crops.

ROTATION "L"

First year—Hay.

Second year—Hay manured in autumn, 12 tons per acre.

Third year—Hay, broken after harvest six inches deep and cultivated for balance of season.

Fourth year—Wheat.

Fifth year—Oats.

Sixth year—Barley, seeded with 4 pounds timothy, 4 pounds alsike, and 4 pounds red clover per acre.

ROTATION "L"—6 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		tons	tons	$	$	$	$
1	Hay (6 years)	0·63	1·47	9 45	9 70	−0 25	6 54
2	Hay (5 years)	0·42	1·66	6 30	9 21	−2 91	8 90
3	Hay (5 years)	0·41	1·30	6 15	9 21	−3 06	5 70
		bush.	bush.				
4	Wheat (7 years)	14·3	26·4	19 64	16 62	3 02	11 06
5	Oats (7 years)	15·7	43·3	8 89	13 11	−4 22	5 38
6	Barley (7 years)	12·3	24·4	7 00	12 47	−5 47	0 15
	Totals for rotation	.....	.....	57 43	70 32	−12 89	37 73
	Average per acre	.....	.....	9 57	11 72	−2 15	6 29

Rotation "L" produced an average loss per acre in 1929 of $2.15 but an annual profit per acre of $6.29 during the period it has been under test.

This rotation, as indicated by the yields and financial returns per acre, gives good returns in seasons when the precipitation is average or above normal but is not satisfactory in a dry season such as 1929. The hay mixture of timothy, alsike and red clover is a very poor mixture for a dry year or district but gives excellent returns in wet years and in the more humid districts and locations.

It will be observed that the yields of both hay and grain are very low as one would expect with such a rotation in a dry year. This rotation is not a safe mixed-farming rotation for Central Alberta as our annual precipitation frequently falls so low that the returns make the rotation unprofitable. The profitable returns produced over a period of years are due to the fact that wet years have predominated during the period the rotation has been under test; had dry years predominated the results would have been much less favourable.

ROTATION " FALL RYE "

First year—Wheat, 15 tons rotted manure applied during the winter and ploughed under in spring.

Second year—Oats for silage, fall rye seeded on disked oat stubble.

Third year—Fall rye.

Fourth year—Summer-fallow.

ROTATION "FALL-RYE"—4 YEARS—SUMMARY OF YIELDS, VALUE AND PROFIT AND LOSS (PER ACRE)

Rotation year	Crop	Yield per acre		Value of crop, 1929	Cost of production, 1929	Profit or loss per acre	
		1929	Average			1929	Average
		bush.	bush.	$	$	$	$
1	Wheat (7 years)	22·7	34·4	32 18	27 96	4 22	16 28
2	Oats for silage (6 years)	tons 4·17	tons 7·19	16 68	21 21	−4 53	8 23
3	Fall rye (5 years)	bush. 14·0	bush. 28·8	13 04	13 96	−0 92	1 66
4	Summer-fallow (7 years)						−9 38
	Totals for rotation			61 90	63 13	−1 23	16 79
	Average per acre			15 47	15 78	−0 31	4 20

Rotation " Fall Rye " produced an average loss of thirty-one cents per acre in 1929 but an average profit per acre of $4.20 during the period it has been under test. The small returns per acre in 1929 are due to the extremely low yield of green oats due to the dry weather and the low yield of winter rye due to a high percentage of winter killing.

This rotation has given fair returns but is not the kind of rotation the average farmer would care to use. It was outlined primarily for those farms where winter rye is used as one of the principal farm crops. Since winter rye is used in a limited way only, this rotation would therefore have a limited application.

In rotation " Alfalfa ", the land is in alfalfa continuously. In this particular field the land has produced alfalfa from the same stand for seven continuous years. The yields in 1929 were very light, one-half ton from the first cutting, due to the encroachment of grasses and dry weather. It would seem that this seeding had progressed to the point where it is advisable to renew the stand.

Rotation " Timothy " is a block of land which grows timothy continuously. It has produced an average yield of 1·81 tons of hay per acre during the past four years but less than one-half ton per acre in 1929. This timothy sod did not produce well as a result of the dry weather and because the stand is sod bound and needs renewing.

Rotation " Brome ", consisting of brome grass continuously, gave an average yield of 1·21 tons per acre during the past 6 years and an average yield per acre of one-half ton in 1929. It was rejuvenated in 1926 by ploughing and working down into a level seed bed, but has had no further cultivation or treatment.

Rotation " Western Rye ", consisting of rye grass continuously gave an average yield per acre of 1·09 tons during the past four years and about one-quarter ton per acre in 1929. This is the least productive and profitable of the rotations under test.

CULTURAL EXPERIMENTS

In reviewing the data presented in these experiments with different cultural treatments, the reader should keep in mind that these experiments were conducted on a sandy loam soil and that the average annual precipitation at the Station is 17·7 inches and that the precipitation during 1929 was 12·92 inches, a total of 4·78 inches below the average. Had these experiments been conducted under different conditions as to soil and climate, the results might have been somewhat different.

SUMMER-FALLOW TREATMENT

This experiment was designed to ascertain the effect of different methods of cultivating the summer-fallow on yield, weed control and other factors incidental to crop production. The following three-year rotation has been followed: First year, summer-fallow; second year, wheat, fall plough for oats; third year, oats. Plots 1, 3, 7 and 11 are checks. As the summer-fallow treatment might be reflected in the second crop following the summer-fallow, the data of this crop are also presented in tabular form.

SUMMER-FALLOW TREATMENT FOR WHEAT

Plot No.	Plot treatment	Yield per acre	
		Yield 1929	Average yield 7 years
		bush.	bush.
1	Plough 6 inches deep June 15, cultivate as necessary	19·3	26·6
2	Plough 6 inches deep May 15, cultivate as necessary	21·3	29·0
3	Plough 6 inches deep June 15, cultivate as necessary	22·7	30·3
4	Plough 6 inches deep July 15, cultivate as necessary	18·0	29·6
5	Plough 6 inches deep June 15, and September 15, cultivate as necessary	12·0	29·4
6	Cultivate after harvest and plough 6 inches deep June 15, cultivate as necessary	14·0	31·4
7	Plough 6 inches deep June 15, cultivate as necessary	16·7	31·6
8	Fall plough 4 inches deep after harvest and plough 6 inches deep June 15, cultivate as necessary	16·7	31·8
9	Disk after harvest and cultivate throughout summer-fallow year (do not plough)	16·3	30·9
10	Cultivate throughout the summer-fallow year. This plot is not ploughed at any time during the experiment	13·0	32·0
11	Plough 6 inches deep June 15, cultivate as necessary	16·0	33·4

OATS FOLLOWING SUMMER-FALLOW TREATMENT FOR WHEAT

Plot No.	Plot treatment			Yield of oats per acre	
				Yield 1929	Average yield 7 years
	Disk Harrow	Harrow	Pack	bush.	bush.
1	April 22	May 6	May 8	27·1	45·6
2	April 22	May 6	May 8	23·5	51·5
3	April 22	May 6	May 8	24·7	51·4
4	April 22	May 6	May 8	20·0	53·5
5	April 22	May 6	May 8	21·2	53·7
6	April 22	May 6	May 8	28·2	58·4
7	April 22	May 6	May 8	23·5	57·9
8	April 22	May 6	May 8	22·4	57·8
9	April 22	May 6	May 8	23·5	61·2
10	April 22	May 6	May 8	24·7	62·4
11	April 22	May 6	May 8	22·4	65·1

The yields produced by the different summer-fallow treatments show some striking contrasts. It will be observed that the yields produced in 1929 show a marked reduction as compared with the average of the past 7 years, and that they also show a much greater variation than the averages. It is believed that this is due to seasonal conditions which prevailed in 1929 as a result of which various treatments influenced the ultimate yield of the crop to a greater extent than was the case during years with a more plentiful precipitation.

Unusual as it may appear, 1929 was the first season during which the early ploughing of summer-fallow gave any pronounced increased yield per acre over late ploughing. The results of the 7-year average of this phase of the experiment show no advantage for the early ploughing. These results may be the result of a large proportion of the seasonal precipitation occurring after the last ploughing which tended to reduce the effect of dates of ploughing. Plot 9 which was summer-fallowed without ploughing gave as good returns in 1929 as any of the others, but plot 10 which has not been ploughed since the experiment was started gave a very low yield, although the average yield has been very good.

The yields produced by the oats, which are the second crop following summer-fallow, indicate that there is little or no summer-fallow effect carried over to the second year. It is also interesting to note that the oats on plot 10 yielded as well as any of the other plots, which leads one to believe that ploughing is not absolutely essential on the kinds of land and under the conditions which prevailed during this experiment.

SUMMER-FALLOW SUBSTITUTES

The object of this experiment is to study the effect of different intertilled crops as compared with the bare fallow on the production of wheat. A three-year rotation of summer-fallow or summer-fallow substitutes, wheat, and wheat, is followed in this experiment. The yield of the summer-fallow substitutes as well as the two succeeding wheat crops is presented in tabular form.

Yield of Summer-Fallow Substitutes and Succeeding Wheat Crops

Plot No.	Plot treatment	Summer-fallow substitute		Wheat, 1st crop, yield per acre		Wheat, 2nd crop, yield per acre	
		1929	8-year average	1929	7-year average	1929	7-year average
		tons	tons	bush.	bush.	bush.	bush.
1	Summer-fallow	.....	.....	16·0	26·2	8·0	20·5
2	Corn	3·40	7·29	18·0	21·3	2·7	18·6
3	Sunflowers	8·74	12·96	14·0	22·8	2·0	18·5
4	Oat green-feed	1·24	5·16	11·3	19·0	1·3	16·9
5	Summer-fallow	.....	.....	15·0	24·8	4·0	18·2
		bush.	bush.				
6	Oats (3 bush. per acre)	16·5	40·3	8·7	10·1	3·3	14·4
7	Oats (1½ bush. per acre)	16·5	58·4	9·3	14·7	3·3	14·3
8	Summer-fallow	.....	.....	14·7	25·5	5·3	16·4
9	Oats, 2 drills alternating with 36 inches intertilled space	16·5	38·9	14·0	19·1	9·3	16·8
10	Oats, 3 drills, alternating with 36 inches intertilled space	32·9	43·6	18·0	20·9	8·0	17·9
11	Summer-fallow	.....	.....	13·3	24·4	7·0	19·4
12	Oats, 4 drills, alternating with 36 inches intertilled space	25·9	41·0	13·3	18·1	2·0	16·7
13	Oats, 5 drills, alternating with 36 inches intertilled space	37·6	41·2	12·0	17·6	7·0	17·6
14	Summer-fallow	.....	.....	12·7	26·2	4·7	20·5
		tons	tons				
15	Corn and oats	1·72	7·68	15·7	17·8	4·0	.....
16	Sunflowers and oats	2·20	10·15	16·7	20·4	13·3	.....

The crops grown as summer-fallow substitutes are worthy of some consideration. It will be observed that the relative yields of sunflowers, corn and oat green feed are in the order mentioned. These three crops are our principle summer-fallow substitutes which can be grown as annuals. Sunflowers will produce larger yields per acre than any other silage crop. They also make a better smother crop than corn, in that they are more leafy and shade the ground, thus preventing the development of young seedlings. The fact that sunflowers are gross feeders is illustrated by the 1929 wheat yields following the summer-fallow substitutes, but it will be observed that the 7 year averages do not bear out this statement. Apparently moisture is the factor involved to a greater extent than any other as sunflowers appear to be as good a summer-fallow substitute crop as any other in years with an abundance of precipitation.

Corn is an excellent crop in many respects. Like other intertilled crops, it does not effectively control perennial weeds such as couch grass, etc., and like other intertilled crops, will leave the land more heavily polluted with weeds unless the crop is kept clean. Where ordinary care is used in producing the crop, corn is one of the best summer-fallow substitute crops.

Oat greenfeed does not appear to be as good a summer-fallow substitute as the intertilled crops when the yield of the succeeding crop is considered. On the other hand, oat greenfeed is a safer crop for the average farmer to use as there is less likelihood of the weed content of the soil being increased while this crop is being grown, than is possible when an intertilled crop is neglected.

Oats seeded at three, and one and a half bushels per acre appeared to have no particular merit as summer-fallow substitutes. Their effect on subsequent crops would be similar to that of any other cereal.

Grain in two, three, four and five row groups alternating with a 36 inch intertilled space appears to have no particular merits as a substitute. The space between the rows of grain appear to give the weeds an excellent opportunity to increase.

The oats and corn, and oats and sunflowers in rows appear to have some advantages. When grown in single rows, the intertillage is made as complete as possible; none of the land near the crop is left untilled for weed production, the oats growing between the corn or sunflowers in the row prevent the development of weeds in the rows and keep the growth of corn and sunflowers down to the point where the crop can be harvested with a grain binder. The corn and sunflowers, being small and mixed with the oats, make it possible to use this crop as dry fodder.

The land on which this experiment is conducted is heavily infested with quack grass. This experiment provides an excellent test of the relative value of the different treatments in controlling this weed. It is quite evident that the intertilled crops are not as effective in controlling this weed as the bare fallow. In fact the bare fallow is the only treatment that holds quack grass in subjection.

STUBBLE TREATMENT

This experiment was designed to ascertain the most satisfactory method of treatment of wheat stubble in preparation for wheat and oats. A three-year rotation of summer-fallow, wheat, and wheat and oats, is followed. The summer-fallow is given uniform treatment, the variation in cultural methods occurring in the preparation of the wheat stubble for wheat and oats.

WHEAT STUBBLE TREATMENT IN PREPARATION FOR WHEAT

Plot No.	Plot treatment	Yield per acre	
		Yield 1929	Average yield 7-years
		bush.	bush.
1	Plough in autumn	5·3	26·5
2	Plough in spring	9·0	24·0
3	Disk stubble in spring and seed	6·7	25·3
4	Plough in autumn	7·3	26·1
5	Burn stubble in spring, plough and seed	10·7	25·9
6	Burn stubble in spring, disk and seed	7·0	20·3
7	Plough in autumn	5·3	21·0

WHEAT STUBBLE TREATMENT IN PREPARATION FOR OATS

8	Plough in autumn	25·9	52·0
9	Plough in spring	24·7	45·8
10	Burn stubble in spring, disk and seed	22·4	39·1
11	Plough in autumn	30·6	54·1

The results of the different treatments of wheat stubble in preparation for wheat and oats indicate that the method of preparation had but little influence on the yield per acre either in 1929 or during the past seven years. It should be borne in mind in considering these results that the experiment was conducted on a friable loam that is reasonably free from weeds. Had the soil, and seasonal precipitation been different the yearly and average results would doubtless have been quite different.

The results, when we consider each year by itself, indicate that spring ploughing is preferable to fall ploughing when there is a decided lack of moisture in the fall, and that fall ploughing gives best results when the land goes into the winter with a high moisture content.

The seven years' average shows that burning the stubble and disking the land is not sufficient preparation for highest yields. It would seem doubtful if there is any advantage whatever to be gained from burning the stubble, unless the soil is infested with harmful insects or plant diseases, or is so heavy that it prevents the proper operation of tillage implements.

BARNYARD MANURE FOR SUNFLOWERS

This experiment is designed to study the effect of different manurial treatments on the yield and maturity of sunflowers. A three year rotation of sunflowers, wheat and wheat is used in this experiment. The manurial treatment is applied in such a way that the sunflowers are affected.

BARNYARD MANURE FOR SUNFLOWERS

Plot No.	Plot treatment	Yield per acre	
		Yield 1929	Average yield 6-years
		tons	tons
1	No manure, second year wheat stubble fall ploughed	4·32	13·66
2	10 tons rotted manure, second year wheat stubble fall ploughed	6·08	17·86
3	10 tons rotted manure, second year wheat stubble spring ploughed	4·30	16·50
4	No manure, second year wheat stubble fall ploughed	4·90	14·66
5	20 tons rotted manure, second year wheat stubble spring ploughed	6·90	19·36
6	10 tons unrotted manure, second year wheat stubble spring ploughed	6·22	17·89
7	No manure, land summer-fallowed	7·54	19·72
8	10 tons rotted manure, land summer-fallowed	7·90	23·18
9	No manure, second year wheat stubble fall ploughed	5·96	15·92

There appears to be no doubt that the application of barnyard manure in any form is reflected in an increased yield per acre. It is doubtful, however, if this increase in the yield per acre justifies the cost of application. On the other hand, since the use of barnyard manure results in an increased yield, it would seem wise to utilize any available manure provided it can be done at no great additional cost.

The increased yield resulting from summer-fallowing the land to be used for sunflowers is insufficient to justify the cost of the land being idle for a season and the cost of maintaining a proper summer-fallow.

BARNYARD MANURE FOR POTATOES

The application of barnyard manure for potatoes resulted in an increased yield per acre, but it is doubtful if this yield is sufficient to justify the cost with potatoes at normal values. The land on which the potatoes were grown is a very fertile black loam, which might partially account for the small increases resulting from the use of barnyard manure. It would seem possible that poorer soils would reflect the increased soil fertility resulting from the use of barnyard manure by larger yield differences.

THINNING SUNFLOWERS TO DIFFERENT DISTANCES

The object of this experiment is to determine the distance apart in the row sunflowers should be thinned to result in optimum yields of the highest feeding value. A three-year rotation of sunflowers, oats and oats is followed in this experiment. The results of thinning sunflowers are given in tabular form.

THINNING SUNFLOWERS TO DIFFERENT DISTANCES

Plot No.	Plot treatment	Yield per acre	
		Yield 1929	Average yield 5-years
		tons	tons
1	Plots thinned to 3 inches apart in row and rows 36 inches apart	5·00	11·64
2	Plots thinned to 6 inches apart in row and rows 36 inches apart	5·88	13·15
3	Plots thinned to 9 inches apart in row and rows 36 inches apart	5·40	12·86
4	Plots thinned to 12 inches apart in row and rows 36 inches apart	5·50	13·00
5	Plots thinned to 6 inches apart in row and rows 42 inches apart	5·88	10·77

It will be observed that there is little difference in the yield per acre produced by the different treatments. Observations in the field indicate that plants growing about six inches apart in the row apparently produce the nicest crop with respect to height and size of the stalks. Plants thinned to three inches apart are rather short and have very fine stems and tend to lodge in bad storms, while plants nine to twelve inches apart tend to be too big and coarse, producing bundles that are very difficult to handle in the field and at the cutting box.

PLACE IN ROTATION TO SEED WINTER RYE

This experiment was designed to study the effect of seeding fall rye in combination with and following other crops as compared with seeding in the regular way. The method of seeding and yields produced are presented in tabular form.

PLACE IN ROTATION TO SEED WINTER RYE—RESULTS OF TEST

Plot No.	Plot treatment	First year of rotation, miscellaneous crops		Second year of rotation, fall rye	
		Yield 1929	Avearge yield 7 years	Yield 1929	Average yield 7 years
		bush.	bush.	bush.	bush.
1	Summer-fallow, fall rye seeded August 15	.....	.....	27·1	25·8
2	Wheat, fall rye seeded with wheat in spring	28·0	21·7	7·9	15·3
3	Wheat, fall rye seeded on disked wheat stubble	25·3	28·1	3·6	16·7
4	Barley, fall rye seeded with barley in spring	28·3	22·4	9·3	13·5
5	Summer-fallow, fall rye seeded August 15	.....	.....	13·6	24·8
6	Barley, fall rye seeded on disked barley stubble	25·0	29·3	5·0	19·4
7	Barley, fall rye seeded on fall-ploughed barley stubble	21·7	31·3	1·8	17·3
8	Oats, fall rye seeded with oats in spring	29·4	41·2	7·1	12·7
9	Summer-fallow, fall rye seeded August 15	.....	.....	15·0	24·6
10	Oats, fall rye seeded on disked oat stubble	36·5 tons	60·9 tons	5·0	16·7
11	Oat greenfeed, fall rye seeded with oats at seeding	0·29	2·08	4·3	13·0
12	Sunflowers, fall rye seeded immediately after harvest	6·60	17·31	10·7	23·8
13	Summer-fallow, fall rye seeded August 15	.....	.....	14·3	24·6
14	Oat greenfeed, fall rye seeded when oats are about 4 inches high	0·24	2·11	7·9	19·5
15	Western rye, sod ploughed after hay is removed and fall rye seeded	.....	0·48	4·3	13·7

Winter rye acts as a weed in all cases where it is seeded in the spring with another cereal as nurse crop. This point is brought out more clearly in the seven year average than in the 1929 yields. In addition to its influence as a weed on the nurse crop, there is the possibility of winter rye reducing the commercial grade of the threshed grain.

Both the 1929 and the seven year average yields of winter rye following the different treatments indicate that the winter rye following the summer-fallow will undoubtedly produce bigger yields than will the same crop following any other treatment.

The yield per acre of the winter rye following the different treatments does not indicate the true valuation of the treatments involved. It is a question of whether the increase in the yield per acre as a result of seeding the winter rye on summer-fallowed land is equal in value to the crops of cereals used as a nurse crop. In reviewing the results, it would seem that the annual precipitation materially influences the yields following the different treatments. Summer-fallowing appears to be the only suitable treatment for winter rye in a year with a limited rainfall, while other treatments are fairly satisfactory in a year with an abundance of moisture.

If a grower wishes to produce winter rye without first summer-fallowing his land, the most practical preparation is that of stubbling it in following an early maturing crop of wheat, oats or barley, or oat greenfeed. If early maturing varieties of these crops are used, the crop can be ripened, harvested and threshed by the middle of September. Experience has proven that winter rye seeded not later than September 15 on a well disked stubble usually gives satisfactory results.

The winter rye apparently does better on disking than fall ploughing. Apparently ploughing loosens the soil to such an extent that a poorer germination results and a less vigorous stand is obtained. Fall ploughed sod is particularly unsatisfactory in a very dry year and has proven the least satisfactory of the different treatments tested.

DATES OF SEEDING WINTER RYE

The object of this experiment is to determine the date of seeding fall rye that will result in the largest yields per acre. A three-year rotation of summer-

fallow, fall rye and oats is followed. The dates of seeding and yields are presented in tabular form.

DATES OF SEEDING WINTER RYE—RESULTS OF TESTS

Plot No.	Date of seeding	Yield per acre	
		Yield 1929	Average yield 7 years
		bush.	bush.
1	Seeded August 15	15·0	21·8
2	Seeded July 1	10·0	19·0
3	Seeded July 15	13·0	22·8
4	Seeded August 1	4·3	25·5
5	Seeded August 15	17·1	25·3
6	Seeded September 1	13·0	29·5
7	Seeded September 15	13·0	29·0
8	Seeded October 1	12·1	20·1
9	Seeded October 15	9·3	25·1

The yields produced in this experiment in 1929 are somewhat conflicting. The averages of the past seven years are quite consistent and indicate that the best time to seed fall rye is between August 1 and September 15. The last date is later than is usually considered advisable to seed this crop. It may be of interest to some to know that some of the finest crops harvested have been produced by the October 1st seeding.

DATES OF SEEDING CORN AND SUNFLOWERS

The object of this experiment is to determine the date on which sunflowers and corn should be planted to obtain best results. A three-year rotation of sunflowers or corn, wheat and oats is followed. The dates of seeding and yields produced are presented in the accompanying table:—

DATES OF SEEDING CORN AND SUNFLOWERS

Plot No.	Plot treatment	Yield per acre	
		Yield 1929	Average yield 8 years
		tons	tons
1	Corn seeded May 1	3·60	8·55
2	Corn seeded May 8	2·76	8·38
3	Corn seeded May 15	3·12	9·73
4	Corn seeded May 22	3·20	9·56
5	Corn seeded May 29	3·64	9·61
6	Corn seeded June 5	1·42	9·60
1	Sunflowers seeded May 1	7·72	17·28
2	Sunflowers seeded May 8	6·88	16·71
3	Sunflowers seeded May 15	8·60	15·72
4	Sunflowers seeded May 22	8·88	16·22
5	Sunflowers seeded May 29	9·24	16·15
6	Sunflowers seeded June 5	6·40	14·19

The results of this experiment indicate that the yields of both corn and sunflowers are not materially influenced by the date of seeding. Observations made in the field indicate that, when quality of the fodder produced is taken into consideration, the most satisfactory results are obtained from corn planted during the second and third weeks of May, and from the earlier plantings of sunflowers. The late plantings of both corn and sunflowers have a very high moisture content and have a correspondingly low feed value.

CEREALS

The season of 1929 was one of the driest in the history of the Station. Spring opened with ideal conditions for seeding and the cereals were all seeded earlier than usual on well prepared land. The precipitation during May, June and July amounted to 3·4 inches only. The cereal plots would have made a very poor showing if they had not been seeded on a well cared for summer-fallow. No frost damage occurred during the growing season.

VARIETY TESTS WITH SPRING WHEAT

The wheats included in this experiment were seeded on April 26, and the young plants emerged from the ground on May 17. Yields and other data for 1929 are presented in the tables relating to this phase of cereal work.

VARIETY TESTS WITH WHEAT-RESULTS IN 1929

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.	lb.	bush.
Ceres	Aug 16	112	36	64	34·2
Early Red Fife Ott. 16	" 24	120	35	62·5	35·2
Early Triumph	" 17	113	35	62·5	36·3
Garnet Ott. 652	" 17	113	36	62·5	41·1
Huron Ott. 3	" 22	118	43	62	43·3
Kota	" 23	119	43	63	36·2
Kitchener	" 24	120	42	61	45·7
Marquis Ott. 15	" 24	120	38	63·5	43·7
Marquis 10B	" 24	120	38	63	46·4
Producer Ott. 197	" 19	115	38	62·5	49·8
Red Bobs No. 222	" 23	119	36	62	40·3
Renfrew	" 26	122	40	61	44·3
Reward Ott. 928	" 17	113	36	63	35·8
Ruby Ott. 623	" 17	113	37	63	39·3
Supreme	" 24	120	37	63	40·0

AVERAGE YIELD FOR FIVE YEARS

Variety	Number of days maturing	Yield of grain per acre
Ceres	116	30·7*
Early Red Fife Ott. 16	124	37·8
Early Triumph	117	44·4†
Garnet Ottawa 652	110	44·2
Huron Ottawa 3	118	42·7
Kota	120	36·1
Kitchener	121	46·5
Marquis Ottawa 15	121	44·7
Marquis 10 B	120	44·1
Producer Ottawa 197	117	48·5
Renfrew	125	42·3
Reward Ottawa 928	114	40·0
Ruby Ottawa 623	111	37·1
Red Bobs, 222	118	46·3†
Supreme	119	47·3†

* Three-year average.
† Four-year average.

Data for both 1929 and the average of the past five years are given to enable the reader to more intelligently interpret the experimental results.

Experience gained over a number of years indicates that yield is not the only factor one should consider in selecting a variety to grow. The commercial grade, quality of flour produced, strength and quantity of straw, and the qualifications of a variety as a combine wheat should all be considered. It is doubtful if wheat growers, who are farming in districts where Marquis will mature and is not affected with rust, could do better than continue to grow Marquis as the major portion of their commercial crop. All the varieties listed in the accompanying table that have outyielded Marquis in the five-year average are inferior to it in some way. Marquis has reasonably strong straw, shatters less than most varieties, hence should be one of our best combine wheats, and is of unquestionable milling value. It would therefore seem wise to grow Marquis, or an earlier maturing sort in districts where Marquis is liable to injury from early fall frosts.

Reward Ottawa 928 has been grown at this Station during the past eight years and has attracted favourable attention since it was first included in the test plots. The threshed grain of this variety has consistently proven itself as both an exhibition and milling wheat. It is among our best with respect to strength of straw. Unfortunately some of the seed of the original stocks distributed became infected with loose smut and the impression has become general that the variety is particularly susceptible to this disease. This impression has not been substantiated by investigation and it would seem that all that is necessary to grow a crop free from this disease is to use disease free seed. It would seem that this variety, in spite of the fact that it will not yield quite as well as some others, will eventually replace other early maturing sorts.

Garnet Ottawa 652 will produce heavier yields than any variety of similar early maturity. It has been criticised as a flour wheat by Canadian millers but has met with favour by the European trade. The discrimination against this variety by the Canadian millers, together with the decision of the Grain Commission to keep this wheat out of the No. 1 grade, has established a prejudice against this excellent variety which will be very difficult for it to overcome. In view of these conditions it seems probable that Reward, though a lower yielding sort, will eventually replace Garnet.

The early maturing selections of Bobs, namely Supreme, Early Triumph, and Red Bobs 222, are among our heaviest yielding sorts and have given excellent satisfaction in many districts. They lack the quality of Reward when grown in the park belt of the Province and for that reason, take a lower commercial grade and are steadily giving way to this variety.

Renfrew is too late maturing to warrant its production in the park belt of the province. It has given a good account of itself in the open plains section, but it is doubtful if it would be wise to replace Marquis with this variety over the major portion of the wheat growing area.

The other varieties mentioned in this experiment have no place in the agriculture of the province. They have not proven to be superior to those varieties recommended, or they exhibit some characteristic which make their production unwarranted.

ROD ROW EXPERIMENTS WITH CEREALS

There are a large number of cereal varieties which are of interest to the country as a whole, but not of sufficient importance to warrant their inclusion in large plots. These are compared along with standard varieties in what are known as rod row plots. In this method of testing varieties, a similar number of viable seeds, representing the standard rate of seeding of that class of grain, are sown in small plots composed of five rod rows. Each variety is replicated three or seven times as its importance warrants. During 1929, 76 varieties and strains of wheat, 40 varieties and strains of oats and 34 varieties and strains of barley were compared. The yields and other data of these tests are

presented in tabular form. It will be noted that the yields are given in grams. This may be a little confusing, but it should be borne in mind that the yields are relative as would be the case if the yields were presented in bushels. Some question might arise as to the accuracy of yields from such small areas. The general impression among men engaged in experimental work is that, because of the greater accuracy in seeding, harvesting, threshing, and the care taken in choosing the land for the experiment, the results from experiments in comparing varieties produced on small areas is as accurate as those where larger areas are involved.

TESTS OF VARIETIES OF WHEAT

Date of sowing, April 26, 1929. Five rod-rows

Name of variety	Number of days maturing	Average length straw including heads	Strength of straw scale 10 points	Average yield in gms.	
				4 plots	8 plots
				gms.	gms.
Apollo No. 1850	106	36	10	650·3	.....
Aurora	106	38	10	673·8	.....
Brown Head	107	39	10	666·6	.....
Brownie Ott. 49	106	39	10	491·2	.....
Ceres	108	38	10	589·7	.....
Chelsea Ottawa 10	107	40	10	650·8	.....
Croesus No. 1846	113	37	10	773·1	.....
Crown Ottawa 353	108	31	10	570·0	.....
Duchess Ottawa 933	106	32	10	620·6	.....
Early Broach	114	34	10	765·3	.....
Early Red Fife Ottawa 16	118	35	10	849·1	651·9
Ely. Red Fife No. 25–48	112	34	10	705·4	744·9
Early Triumph	112	35	10	750·9	703·5
Early Triumph (Wh)	109	35	10	701·7	.....
Garnet Ottawa 652	109	36	10	709·6	753·9
Garnet Lac. 27	109	36	10	867·9	794·7
Garnet No. 15	109	36	10	811·7	755·4
Hard Federation	113	28	10	711·9	.....
Huron Ottawa 3	119	43	10	1,189·3	.....
Hybrid No. 100	118	42	10	797·8	.....
Kitchener	128	42	10	934·5	874·6
Kota	119	46	10	814·8	.....
Kubanka Ottawa 37	128	46	10	756·2	.....
Major Ottawa 522	118	44	10	547·6	.....
Marchosser	114	44	10	762·8	.....
Marquis, Criddle	119	39	10	932·0	.....
Marquis, McD. 144	119	41	10	771·3	.....
Marquis, McKay	119	38	10	861·0	.....
Marquis, Ottawa No. 15	119	37	10	741·1	758·4
Marquis, Sask. 7	119	37	10	873·9	.....
Marquis, Sask. 70	119	39	10	663·1	.....
Marquis, Plot 1, A	119	38	10	651·4	.....
Marquis, Plot 10 B	119	38	10	625·8	.....
Master Ottawa 520	108	31	10	313·2	.....
Orchards	120	38	10	605·1	.....
Parkers	114	37	10	615·7	.....
Pioneer Ottawa 195	116	35	10	515·1	.....
Planet No. 1849	119	36	10	795·1	.....
Prelude Ottawa 135	108	33	10	346·3	.....
Preston	119	37	10	757·5	.....
Producer, Ottawa No. 197	114	38	10	642·1	.....
Producer A	114	38	10	715·9	.....
Producer B	114	39	10	665·2	.....
Producer C	114	38	10	732·5	.....
Producer D	114	37	10	761·5	.....
Producer E	114	38	10	586·1	.....
Producer F	111	36	10	516·3	.....
Producer G	114	39	10	785·3	.....
Producer H	114	40	10	816·2	.....
Producer J	114	41	10	714·4	.....
Producer K	114	40	10	727·6	.....
Quality	112	35	10	682·6	.....
Red Bobs No. 222	113	36	10	758·7	749·0
Red Fife Ottawa 17	128	38	10	758·6	736·7
Red Quality A	113	38	10	564·4	.....
Reliance	119	36	10	893·2	.....
Reliance No. 1851	119	35	10	884·6	.....
Renfrew	121	40	10	885·1	816·4

TESTS OF VARIETIES OF WHEAT—*Conc.*

Date of sowing, April 26, 1929. Five rod-rows—*Conc.*

Name of variety	Number of days maturing	Average length straw including heads	Strength of straw scale 10 points	Average yield in gms.	
				4 plots	8 plots
				gms.	gms.
Reward Ottawa 928	111	36	10	551·4	570·2
Reward Lac, 27	110	36	10	484·3	525·4
Romanow	113	39	10	673·5	.....
Ruby Ottawa 623	112	37	10	544·1	582·1
Segelstad	118	35	10	752·6	.....
Siberian No. 1	105	35	10	601·3	.....
Supreme	114	37	10	731·4	757·5
Vermilion	119	39	10	921·8	.....
White Head	119	41	10	779·4	.....
1 B. Fisher	119	38	10	834·6	.....
2 B. Fisher	115	39	10	863·6	.....
928 L 6	113	37	10	710·4	.....
928 P	112	35	10	599·1	.....
928 QQ2	112	35	10	640·0	.....
928 WID	112	35	10	571·5	.....
929 B	112	35	10	567·0	.....
932 A	111	35	10	488·3	.....
939 D	113	38	10	481·8	.....

TESTS OF VARIETIES OF OATS

Date of seeding, April 26, 1929 Five rod-rows

Name of variety	Number of days maturing	Average length of straw including head	Strength of straw scale 10 points	Average yield in gms.	
				4 plots	8 plots
				Gms.	Gms.
Abundance	104	27	10·0	886·8	934·7
Alaska	97	38	8·0	579·9	665·6
Alaska x Victory	108	32	10·0	2,728·8	2,150·5
Banner, Dixon	110	36	10·0	985·8	.....
Banner, Dow	110	33	9·5	838·8	.....
Banner, McD	110	35	9·7	1,018·9	.....
Banner, Ottawa 49	110	34	10·0	1,038·8	1,037·9
Banner, Sask	110	34	10·0	959·7	.....
Banner, U.F.A	112	36	10·0	1,078·4	.....
Banner, Waugh	112	39	9·7	1,021·9	.....
Columbian	115	41	9·5	690·8	.....
Danish Island	115	41	9·7	968·6	.....
Daubenay	101	35	10·0	603·8	.....
Diamond (weebull)	110	37	10·0	891·3	.....
Gerlach	115	37	6·5	848·0	.....
Gold Rain	111	38	9·7	919·5	.....
Gopher	101	28	10·0	815·3	821·7
Gopher (Kelly Seed Co.)	101	29	9·9	678·7	.....
Iowa No. 103	99	29	10·0	581·2	.....
Irish Victor	111	34	9·7	927·9	783·0
Irish Victor P	111	39	9·5	1,038·7	.....
Joanette	111	36	9·5	684·3	.....
Laurel, Ottawa 477	105	32	10·0	596·0	555·5
Leader	112	40	8·5	984·6	809·5
Leader B	112	38	8·5	1,225·4	.....
Leader A	104	40	9·8	768·9	.....
Legacy	105	34	9·7	993·2	998·0
Liberty	104	37	9·8	598·8	.....
Longfellow	108	39	9·0	988·1	951·1
Mansholts	112	35	8·5	928·6	.....
Markton No. 1695	105	38	10·0	962·4	.....
Mystery	106	37	10·0	793·6	.....
O.A.C. No. 3	99	35	9·8	621·6	.....
O.A.C. No. 72	111	39	8·5	1,060·6	1,028·2
O.A.C. No. 144	111	41	7·0	810·7	809·6
Prolific	112	38	8·0	885·1	845·3
Star	108	37	10·0	1,125·9	1,073·0
Tartar King	107	40	7·5	787·1	.....
Victory	112	35	8·5	906·5	833·2
White Cross	102	37	9·5	831·6	.....

TEST OF VARIETIES OF BARLEY

Date of seeding April 26, 1929

Five rod-rows

Name of variety	Number of days maturing	Average length straw including head	Strength of straw on scale of 10 points	Average yield in gms.	
				4 plots	8 plots
				gms.	gms.
Alberta Awnless	97	36	10	541·2	.....
Barks	109	37	10	371·8	426·4
Bearer No. 56	104	34	10	900·9	871·7
Bearer, Ottawa 495	104	34	10	1,002·3	1,025·0
Canadian Thorpe	105	32	10	816·5	895·6
Cape	98	25	10	703·1	.....
Charlottetown	108	32	10	825·9	.....
Chinese	103	38	10	835·1	.....
Colossus No. 1,636	102	32	10	500·8	.....
Duckbill	113	33	10	432·9	451·9
Early Chevalier	105	39	10	658·8	.....
Eureka	103	37	10	622·9	.....
Feeder	102	40	10	456·6	.....
Fenil	105	37	10	319·7	.....
Glabron	109	39	10	793·2	.....
Gold	110	28	10	1,000·0	1,043·7
Hannchen	109	31	10	1,057·5	1,111·2
Himalayan	99	24	10	553·1	.....
Junior	99	24	10	498·4	.....
Manchurian	108	34	10	601·2	632·2
O.A.C. No. 21	104	38	10	832·8	870·0
Pearl	101	31	10	628·9	.....
Plumage Archer	114	30	10	916·9	916·3
Regal No. 1865	104	39	10	1,158·3	.....
Star	102	30	10	903·6	.....
Stella	106	38	10	705·7	.....
Success	131	31	10	375·5	.....
Swedish Chevalier	109	30	10	838·4	.....
Trebi	103	29	10	957·4	989·0
Velvet	103	36	10	691·5	.....
Velvet Minn. 447	103	36	10	608·3	.....
465 C	131	28	10	533·3	.....
574b	103	34	10	694·8	.....
910 H	120	31	10	582·1	.....

VARIETY TESTS WITH OATS

The varieties of oats included in this test were seeded on April 27 and appeared above ground on May 16. They were seeded in duplicate plots and made a strong vigorous growth throughout the season. There was no lodging in the plots as a result of the very dry season. Yields and other data are given in the accompanying table.

VARIETY TESTS WITH OATS—RESULTS IN 1929

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.	lb.	bush.
Abundance	Aug. 17	112	32	41	76·8
Alaska	" 6	101	30	39	52·6
Banner McDonald 44	" 18	113	35	40	81·8
Banner, Ottawa 49	" 18	113	34	39	73·8
Daubeney, Ottawa 47	" 7	102	29	37	57·6
Gold Rain	" 14	109	30	44	80·8
Gopher	" 10	105	28	39	77·6
Irish Victor P	" 18	113	34	43	78·8
Prolific	" 18	113	36	41	95·5
Laurel, Ottawa 477	" 14	109	32	49	51·8
Leader	" 17	112	36	41	83·5
Legacy, Ottawa 678	" 14	109	34	40	68·2
Liberty, Ottawa 480	" 10	105	35	49	37·6
Longfellow, Ottawa 478	" 14	109	37	39	55·1
O.A.C. No. 144	" 16	111	38	38	60·3
Star	" 17	112	37	41	74·7
Victory	" 17	112	35	43	88·2
Victory x Alaska	" 15	110	32	39	79·7

OATS—FIVE-YEAR AVERAGES

Variety	Days to mature	Yield per acre
		bush.
Alaska	98	67·3
Banner, Ottawa 49	113	88·0
Daubeney, Ottawa 47	98	76·8
Gold Rain	110	81·6
Irish Victor P	112	78·9
Laurel, Ottawa 477	107	58·2
Leader	113	86·8
Legacy, Ottawa 678	108	82·3
Liberty, Ottawa 480	105	44·7
Longfellow, Ottawa 478	108	74·2
Victory	113	87·1

The five-year averages are a truer criterion of the relative value of the different oat varieties than the 1929 results, in that they indicate the reaction of the varieties to different seasonal conditions.

It has been estimated that fully 90 per cent of the oats grown in the province of Alberta are either Banner or Victory. Banner is the best yielding variety under test at the Station and is considered our best variety for the production of commercial grain, and oat greenfeed. The threshed grain of this variety has a medium long kernel which makes it appear rather lean and less plump than some other varieties, hence it is not as suitable for exhibition purposes as some of our other varieties which have a shorter kernel which is more attractive from an exhibition standpoint.

Victory is an outstanding variety for exhibition purposes, in that the kernel combines length, width, plumpness and thickness of hull in almost ideal proportions when the crop is grown under suitable conditions and well matured. The five-year averages indicate that this variety will give an excellent account of itself as a commercial sort in that it yields almost as well as Banner and is similar to that variety in maturity. The grower would be well advised to make his choice between Banner and Victory for his commercial crop. Leader is a variety which gives an excellent account of itself as a commercial sort. It yields well and matures in about the same number of days as Banner and Victory.

The grain carries a rather high per cent of hull and the straw is very coarse and does not make as good feed as that of other standard varieties. Its coarse straw is somewhat misleading as regards strength as it does not appear to be particularly good in this respect.

Alaska is the best of the early maturing varieties. It will be observed that this variety is one of our lowest yielding sorts. This is as one would expect as there is usually a sacrifice in yield for early maturity. There are districts in the province where it is advisable to use an early maturing variety because the heavier yielding sorts are too late maturing. This variety is very useful for late spring seeding on the prairie as it will ripen with reasonable certainty if seeded as late as June 1.

The other varieties of oats mentioned on the list are not of sufficient significance to be considered with the above mentioned sorts.

VARIETY TESTS WITH BARLEY

The different varieties of barley were seeded in duplicate plots on April 30 and were up nicely by May 18. They were seeded on land that produced a root crop in 1928, hence the yields are somewhat lower than those produced by the wheat and oat variety plots.

VARIETY TESTS WITH BARLEY—RESULTS IN 1929

Name of variety	Date of ripening	Number of days maturing	Average length of straw including head	Weight per measured bushel after cleaning	Actual yield of grain per acre
			in.	lb.	bush.
Barks	Aug. 18	110	27	49	22·3
Bearer Ottawa 475	" 18	110	34	51	27·5
Canadian Thorpe	" 19	111	32	50	27·1
Chinese Ottawa 60	" 10	102	38	50	29·8
Duckbill Ottawa 57	" 13	105	33	47	24·2
Feeder Ottawa 567	" 7	99	40	47	21·9
Fenil Ottawa 670	" 8	100	37	54	18·7
Gold	" 13	105	28	52	35·6
Hannchen	" 14	106	31	51	51·0
Himalayan Ottawa 59	" 7	99	24	60·5	29·6
Junior Ottawa 471	" 6	98	24	62	27·9
Manchurian Ottawa 50	" 13	105	34	48	30·8
O.A.C. No. 21	" 11	103	38	48·5	33·3
Plumage Archer	" 24	116	29	53·5	37·5
Star	" 10	102	30	46	35·6
Trebi	" 9	101	29	45·5	36·2

BARLEY—AVERAGE FIVE YEARS

Variety	Days to mature	Yield
		bush.
Barks	112	37·8
Bearer Ottawa 475	106	48·6
Canadian Thorpe	109	37·7
Chinese Ottawa 60	100	39·2
Duckbill Ottawa 57	108	31·9
Feeder Ottawa 567	97	29·5
Fenil Ottawa 670	97	23·6
Gold	109	34·1
Himlayan Ottawa 59	95	38·9
Junior Ottawa 471	95	40·6
Manchurian Ottawa 50	102	46·3
O.A.C. No. 21	102	42·4
Trebi	99	54·6

O.A.C. No. 21 is recognized as the standard brewing barley for the Canadian trade. It has a long straw of fair strength, and is a good yielder. The Canadian brewers offer a premium for well matured, plump, bright grain of this variety that is free from impurities. Growers who are considering barley production for the brewing trade would be well advised to use this variety.

Trebi has consistently been one of the heaviest yielding varieties tested at the Station. It has a straw of medium length and strength. The kernels of this variety are larger than those of O.A.C. No. 21. In view of the prejudice against this variety by Canadian brewers, it would seem that the production of this barley should at present be considered mainly from the feed standpoint.

The two-rowed barleys, individually and as a group, produce very fine appearing samples of threshed grain, but they do not yield as well as the six-rowed sorts. Canadian Thorpe and Duckbill are two outstanding varieties of two-rowed barley. They have stronger straw than any of the two-rowed sorts now in the seed trade. Canadian Thorpe will slightly outyield, but has slightly weaker straw than Duckbill. These varieties are only fair yielders, but it is possible that, because of their strength of straw, they may have a place on strong land where other sorts lodge badly.

Hannchen is another two-rowed sort. It usually outyields both Canadian Thorpe and Duckbill, but is not favoured by the brewing trade.

CEREAL IMPROVEMENT

The improvement work with cereals is worthy of mention. Approximately 4,000 pure line selections of wheat, oats and barley were grown in 1929. These were grown with the idea of maintaining purity of variety, or foundation seed, rather than the production of new varieties or strains.

Selections of typical heads of the different varieties are made in the growing crop. These are grown and compared in head rows which are termed the L 1 generation. Approved selections are harvested and threshed by hand and are grown in five rod row increase plots which are termed the L 2 generation. The approved L 2 generation plots of a variety are bulked together and constitute foundation seed of that variety. This seed is sown and produces improved seed of the variety represented, or Elite Stock Seed, in the case of varieties eligible for registration in the Canadian Seed Growers' Association.

MISCELLANEOUS CEREAL WORK

A large number of varieties are grown at the Station just as a matter of interest. These are grown in what are known as nursery plots. Varieties grown in these plots number 67 wheats, 70 oats and 14 barleys.

Verification plots are conducted for the Canadian Seed Growers' Association. In this work samples of grain representing the registered seed grown in the Province of Alberta are grown for comparison or verification as to purity of variety.

This work is largely of an educational nature and has proven of inestimable value in improving the standard of the registered seed of the Province. The samples are submitted under number only and each plot is identified throughout the test by this number. As the crops approach maturity the off-type plants are tagged. A field day is held and each contributor can see for himself the off-type plants his own crops contain as compared with others. The result has been that those with pure seed stocks are showing their plots to others, while those with plots showing a range of variations decided to procure new seed stocks from those with a purer strain. The result has been that all the seed stocks carrying gross off-types and impurities have been eliminated in one year and the purity of the registered seed of the Province materially improved.

Somewhat similar results were obtained in the Elite Stock Seed verification plots. In a few cases, stocks carrying gross off-types were detected. The elimination of these stocks should help maintain the high standard for registered seed grain.

FORAGE CROPS

The season of 1929 was one of the driest in the history of the Station. The result was that the yields of all annual forage crops were much reduced, while hay crops were almost a failure except new seedings sown on summer-fallowed land without a nurse crop. New seedings that were seded down with a nurse crop were complete failures in many cases. Hay yields reported are based on absolute dry matter plus 10 per cent moisture.

VARIETY TESTS WITH ALFALFA

The varieties of alfalfa compared were seeded on June 28, 1928, in quadruplicate one-hundreth-acre plots, without a nurse crop, on land which was treated as a summer-fallow before seeding. The first cutting was made on July 3 and the second cutting was made on August 31. Yields are given in the table relating to the experiment.

RESULTS OF VARIETY TESTS OF ALFALFA

Variety	Source	Hay yields, first cutting	Hay yields, second cutting	Total yield per acre
		tons	tons	tons
Baltic	Disco	2·92	1·78	4·70
Cossack	Disco	2·71	1·75	4·51
Cossack	Paramount Seed Farm, Alta.	2·73	1·54	4·28
Grimm	Alfalfa Seed Growers' Association, Alberta	2·36	1·58	3·94
Grimm	University of Saskatchewan	2·42	1·53	3·95
Grimm	Lyman	2·15	1·48	3·63
Medicago falcata	Paramount Seed Farm, Alta.	1·94	0·50	2·94
Ontario variegated	Peel County, Ontario	2·52	1·81	4·33

VARIETY TESTS OF ALFALFA—RESULTS FOR FIVE YEARS

Variety	Source	Yield of hay per acre in tons					
		1925	1926	1927	1928	1929	Average
Baltic	Disco	1·09	3·16	2·85	2·87	4·70	2·93
Cossack	Disco	1·16	3·02	2·83	2·55	4·51	2·81
Cossack	Paramount Seed Farm, Alta.	1·33	3·03	2·83	2·82	4·27	2·85
Grimm	Alfalfa Seed Growers' Association, Alta.	1·21	2·93	3·11	2·52	3·94	2·74
Grimm	University of Saskatchewan	.....	.....	.....	2·57	3·95	3·26
Grimm	Lyman	0·96	2·54	2·90	2·27	3·63	2·46
Medicago falcata	Paramount Seed Farm, Alta.	.....	.....	.....	.....	2·19	2·19
Ontario variegated	Peel County, Ont.	.....	.....	2·80	2·37	4·33	3·17

It will be observed that the yields produced in 1929 are remarkably high and much higher than the average of the past five years. This may be explained by the fact that the essential factors for a high yield were present; a fertile soil, a sufficient moisture carry-over from the previous season, and a relatively high mean temperature for the district.

These yields are of particular interest as they are an example of the necessity of seeding alfalfa without a nurse crop in districts with a limited precipitation. The year of 1929 was one of the driest on record at the Station. Alfalfa seeded with a nurse crop in 1928 was a complete failure, most of the plants not making sufficient growth to reach the height of the stubble of the nurse crop while that seeded without a nurse crop in this experiment gave the highest yield on record. These results do not hold true in a year with normal precipitation when alfalfa seeded with a nurse crop of wheat makes a good showing.

There appears to be little to choose between the different sorts as far as yield is concerned. The Station has been growing alfalfa successfully for a number of years and attribute this success to the fact that the seed used was grown in the province.

VARIETY TESTS WITH SWEET CLOVER

The different sweet clover varieties were seeded under the same conditions as the alfalfa. The cuttings were made on July 3 for Arctic and July 12 for the remainder of the varieties. The second cutting in all cases was made on August 31. Yields and other data are given in the table relating to the experiment.

RESULTS OF VARIETY TESTS WITH SWEET CLOVER

Variety	Source	Per cent winter-killing	First cutting, yield of hay per acre	Second cutting, yield of hay per acre	Total yields per acre
			tons	tons	
Arctic	Sask. Reg. Seed Growers' Assoc.	0	3·52	1·77	5·29
Arctic No. 439	University of Saskatchewan	2	3·58	1·89	5·47
Common White	Commercial	16	3·28	1·75	5·03
Common Yellow	Commercial	3	4·08	2·65	6·73
Dwarf	Disco	0	4·19	2·31	6·50
Grundy	Disco	0	4·24	2·14	6·38
Maccor	Manitoba Agricultural College	25	3·00	1·72	4·72
Zouave No. 778	University of Saskatchewan	42	2·02	2·06	4·08

VARIETY TESTS WITH SWEET CLOVER—RESULTS FOR FIVE YEARS

Variety	Source	1925	1926	1927	1928	1929	Average
			tons	tons	tons	tons	tons
Arctic	Saskatchewan Reg. Seed Growers' Association	.....	2·08	1·59	3·60	5·29	2·51
Arctic No. 439	University of Saskatchewan	All	.....	.....	.....	5·47	†5·47
Common White	Commercial	var-	2·62	2·29	3·73	5·03	2·73
Common Yellow	Commercial	ieties	2·61	1·79	3·62	6·73	2·95
Dwarf	Disco	winter-	2·86	.....	3·58	6·50	⊕4·31
Grundy	Disco	killed	3·52	1·76	3·55	6·38	3·04
Maccor	Manitoba Agric. College		2·78	1·43	3·33	4·72	*3·06
Zouave No. 778	University of Saskatchewan		.....	.....	.....	4·08	†4·08

†One year only. ⊕3 year average. *4 year average.

Like alfalfa, sweet clover produced yields in 1929 which are decidedly above the average of the past five years. Apparently conditions which prevailed in 1929 were favourable for a maximum production of this legume.

The yields produced by these tests are a revelation as far as variety yields are concerned. They indicate that the coarse stemmed sorts of sweet clover are the lowest yielders when total amount of dry matter per acre is concerned.

It will be observed that Common Yellow Flowered sweet clover is one of the heaviest yielding sorts tested at the Station. These results are supported by the experience of farmers throughout the district who are finding that the yellow flowered sweet clover will give them excellent yields of fodder. The Dwarf and Grundy strains of sweet clover are fine stemmed, early maturing strains that produce large yields of fodder of superior quality.

The Arctic strains of sweet clover have always been dependable sorts and on different occasions have proven slightly hardier than other varieties. They resemble Common White in type of growth, developing into very tall, coarse stemmed plants which are more difficult to handle in harvesting operations, and do not produce as attractive fodder as the smaller, early maturing sorts. Further than this, the smaller growing, early maturing sorts would be more efficient in controlling wild oats as there would be less likelihood of the wild oats being sufficiently matured to germinate when harvested along with the sweet clover.

VARIETY TESTS WITH RED CLOVER

The different varieties of Red Clover were seeded on the same day and in the same way as other legumes and grasses reported herewith. Yields, per cent winter-killing and other data are reported herewith.

VARIETY TESTS WITH RED CLOVER

Variety	Source	Per cent winter-killing per acre	First cutting yield of hay per acre	Second cutting yield of hay per acre	Total yield of hay per acre
			tons	tons	tons
Alfred	Ontario	25	0·98	1·43	2·41
Chateauguay	Quebec	46	1·32	1·67	2·99
Dauphine	S. E. France	41	0·38	0·49	0·87
Early Swedish	Gen. Swedish Seed Company	15	1·13	1·37	2·40
Emilia	Italy	100	.....	.....	.....
Marche	North Central Italy	100	.....	.....	.....
Otofte	Royal Danish Agricultural Society	11	0·85	.....	0·85
Spadone	France	60	0·13	0·84	0·97
St. Clet	Quebec	28	1·01	.....	1·01
Trystofte	Royal Danish Agricultural Society	24	0·87	.....	0·87
Altaswede	University of Alberta	7	2·21	.....	2·21
Kenora	Kenora District Co-operative	38	0·89	0·78	1·67
Late Swedish	General Swedish Seed Company	8	1·17	.....	1·17
Mammoth	Ontario	28	0·94	0·95	1·89
Medium Late Swedish	General Swedish Seed Company	13	0·99	.....	0·99

VARIETY TESTS WITH RED CLOVER

Variety	Source	1925	Yield of hay per acre				
			1926	1927	1928	1929	5 year Average
			tons	tons	tons	tons	tons
Alfred	Ontario		2·82	.....	3·61	2·41	*2·23
Chateauguay	Quebec		2·96	2·25	3·45	2·99	2·31
Dauphine	South East France	All	2·19	.....	3·08	0·87	*1·54
Early Swedish	Gen. Swedish Seed Co	var-	2·15	2·19	3·79	2·40	2·11
Emilia	Italy	ieties	1·54	.....	2·16	.....	*0·93
Marche	North Central Italy	winter	2·20	2·06	1·64	.....	1·18
Otofte	Royal Danish Agricultural Society	killed	.....	.....	3·15	0·85	†2·00
Spadone	France		.....	2·31	2·27	0·97	*1·39
St. Clet	Quebec		2·41	1·19	3·01	1·01	1·52
Trystofte	Royal Danish Agricultural Society		.....	.....	3·00	0·87	†1·94
Altaswede	University of Alberta		2·27	2·75	2·16	2·21	1·88
Kenora	Kenora District Co-operative		2·11	2·69	2·34	1·67	1·76
Late Swedish	General Swedish Seed Company		1·83	2·61	2·30	1·17	1·58
Mammoth	Ontario		.....	.....	.....	1·89	.....
Medium Late Swedish	General Swedish Seed Company		1·94	3·25	1·89	0·99	1·61

* 4 year average. †2 year average.

The per cent winter-killing and the total yield per acre show considerable variation. It will be observed that, in most cases, the varieties that have given the highest yields suffered the least winter injury. There are a number of cases where the second cutting exceeds the first. Where this is the case, the plot suffered considerable winter injury and the plants were in a more or less weakened condition and revived somewhat during the summer, developing strong and vigorous plants by fall.

It is of interest that seeds supplied by different seed associations appear to vary somewhat. Occasionally the seed from an association will be of the Common Red Clover type one year and tending toward the Mammoth type the next, and vice versa.

The average yields indicate that clovers of the double cut type are superior as yielders to the single cut or Mammoth red type. Experience over a unmber of years indicates that the single cut or mammoth red clovers are most suitable for Central and Northern Alberta. The principal reason why this is so is that the clovers of this type appear to be hardier than the strains belonging to the common red types.

The yields of red clover may appear rather misleading in that red clover may appear to be a hardier crop than is actually the case. Records show that red clover was completely winter-killed in 1921-22-24-25, hence hed clover cannot be considered as a really safe legume to grow for hay production. We find that red clovers winter-kill badly in years when there is a shortage of moisture in the fall and flourish when there is an abundance of moisture, or in wet seasons. In giving this a general application we find that red clover does well in the foothills; is only partially successful in the more open portions of the park belt; and is seldom a satisfactory crop on the open plains.

VARIETY TESTS WITH WHITE DUTCH AND ALSIKE

The varieties of White Dutch clover appear to be hardier than either alsike or red clover. They produce excellent yields in moist locations or wet seasons but relatively low yields under dry conditions. It would seem that their principal use would be for pasture crops as they grow so low to the ground that

they are difficult to harvest. Alsike is an excellent hay legume for moist locations. The yields in tons in 1928 were as follows: Alsike 2·55, Commercial (White Dutch) 0·45, Morso (White Dutch) 0·62, Stryno (White Dutch 0·72.

MISCELLANEOUS GRASSES

The accompanying table gives the relative productivity of miscellaneous grasses tested during the past five years. The yield reported is the first crop following land that was partially summer-fallowed and the plots seeded without a nurse crop, hence the yields are larger than one would expect from a general farm crop seeded without a nurse crop.

YIELDS OF MISCELLANEOUS GRASSES

Variety	Yield per acre					Average yields
	1925	1926	1927	1928	1928	
	tons	tons	tons	tons	tons	tons
Commercial brome	1·98	4·33	2·59	1·90	1·70	2·50
Boon timothy	2·18	3·91	2·52	2·21	1·18	2·40
Commercial timothy	2·18	4·53	2·77	2·68	1·23	2·68
Huron timothy	.....	.....	2·55	2·55	1·32	2·14
Commercial western rye	2·99	3·03	2·59	2·63	2·67	2·78
Grazer western rye	2·45	3·32	2·51	2·77	3·59	2·93
Kentucky blue	1·61	3·53	1·10	2·76	0·75	1·95
Poa bulbosa	.....	.....	.....	.....	0·30	0·30
Red top	.....	.....	.....	.....	1·13	1·13

The yields produced by the miscellaneous grasses in 1929 indicate their relative productiveness under rather dry conditions. It will be observed that brome and western rye grass yielded well and that the different strains of timothy yielded relatively low.

Kentucky blue grass does well when there is a normal amount of rainfall but is a rather low yielder when there is a shortage of moisture. It produces the finest quality hay of any of the grasses, and there is the possibility that it might be used to advantage in the different hay and pasture mixtures.

Red Top is a native that grows in low moist places and gives excellent yields when growing in such locations. 1929 was too dry for this grass and the yield was correspondingly low.

Poa bulbosa is a species of blue grass that produces seed in the form of tiny bulbs. It was recently introduced into the United States where it is used for mixing with alfalfa. It grows at very low temperatures and in the Southern States will produce a cutting of hay before the alfalfa starts to grow. It is a very early hay being ready to harvest early in June. It is too soon as yet to predict just what the future for this grass will be.

STRAIN TESTS WITH WESTERN RYE GRASS

Fourteen strains of western rye grass were compared with commercial stock. The yields produced are presented in the accompanying table:—

RESULTS WITH WESTERN RYE GRASS

Variety or strain	Yield of hay per acre
	tons
Commercial	2·67
Grazier	3·59
No. 8	4·12
No. 13	2·50
No. 15	1·84
No. 19	1·74
No. 25	2·96
No. 56	2·98
No. 77	2·91
No. 79	2·58
No. 80	2·69
No. 97	2·46
No. 100	3·07
No. 116	2·77

It will be observed that a number of the strains of western rye grass outyielded the commercial stock. One of these, Grazier, is already in the seed trade and may be purchased from a number of seed companies.

VARIETY TESTS WITH CORN

Nineteen varieties of corn were tested in 1929. They were seeded on May 7 and harvested September 7. Yields and other data are given in the accompanying table. It should be kept in mind in reviewing the data that nothing but the very earliest maturing varieties of corn fully mature in this district and that our best fodder varieties are those of medium to early maturity, or those varieties which attain the dough stage of maturity by the time fall frosts occur. Gehu and North Western Dent are the varieties used as the main farm crop by the Station. It is possible that other varieties of similar maturity might be used with equally good results.

RESULTS OF VARIETY TESTS WITH CORN

Variety	Source	Date of tasseling	Date of silking	Green weight	Per cent dry matter	Dry weight
				tons		tons
North Western Dent	Disco	Aug. 3	Aug. 27	10·65	10·00	1·06
90-Day White Dent	Disco	" 23	.....	11·23	8·91	1·00
Canada Yellow Flint	Duprey & Ferguson	" 6	Aug. 19	8·75	11·52	1·08
North Western Dent	Experimental Farm, Brandon	" 3	" 19	7·26	13·04	0·95
North Western Dent	McKenzie	" 3	" 23	11·27	11·38	1·28
Howes' Alberta Flint	Own Seed	" 1	" 15	4·34	18·88	0·82
Gehu	McKenzie	" 3	" 23	14·14	13·25	1·87
Twitchell's Pride	Ottawa	" 5	" 19	14·55	10·89	1·58
Wisconsin No. 7 x Twitchell's Pride	Summerland	" 14	.....	16·90	10·89	1·84
Yellow Dent	Wimple	" 14	Aug. 27	8·17	10·84	0·89
Hybrid	Wimple	" 23	.....	13·09	10·06	1·32
Golden Glow	Duke	" 12	.....	11·34	10·07	1·14
Leaming No. 9	Duke	" 20	.....	10·98	10·56	1·16
Longfellow	Duke	" 20	.....	12·0	10·26	1·23
Whitecap Yellow Dent	Duke	" 16	.....	11·14	9·78	1·09
Wisconsin No. 7	Duke	" 18	.....	13·44	9·76	1·31
Dakota White Flint	O. Wills	" 5	Aug. 20	14·56	11·44	1·67
North Western Dent	O. Wills	" 2	" 18	12·92	10·72	1·39
Falconer	.....	" 5	" 19	10·46	15·03	1·57

Variety	1925		1926		1927		1928		1929		Average	
	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight	Green weight	Dry weight
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Longfellow	13·05	1·58	17·60	.....	19·24	2·10	14·07	1·03	12·00	1·23	15·19	1·49
Golden Glow	13·68	1·52	8·40	.....	12·35	1·15	6·03	0·41	11·34	1·14	10·36	1·06
Leaming	12·47	1·14	11·00	.....	10·26	1·30	7·76	0·47	10·98	1·16	10·49	1·02
Whitcap Yellow Dent	.....	.....	.....	.....	.....	.....	.....	.....	11·14	1·09	11·04	1·09
Wisconsin No. 7	12·79	1·62	9·10	.....	13·00	1·30	.....	.....	13·44	1·31	12·08	1·41
Howes' Alberta Flint	7·53	0·84	9·10	.....	6·11	1·20	6·43	1·24	4·34	0·82	6·70	1·02
North Western Dent (Disco)	13·26	1·06	15·00	.....	15·13	1·95	8·77	0·73	10·65	1·01	12·56	1·19
90-Day White Dent	14·26	1·16	10·80	.....	15·73	1·80	10·78	1·08	11·23	1·00	12·56	1·26
Canada Yellow Flint	12·68	1·65	15·40	.....	17·94	1·65	.....	.....	8·75	1·08	13·69	1·46
North Western Dent (Brandon)	12·23	1·74	13·60	.....	12·87	2·12	11·05	1·35	7·26	0·95	11·40	1·54
North Western Dent (McKenzie)	11·15	1·60	11·40	.....	14·96	1·91	7·11	0·68	11·27	1·28	11·18	1·37
Gehu	13·06	1·52	15·00	.....	18·00	2·35	9·71	0·95	14·14	1·87	13·98	1·70
Twitchell's Pride	12·74	1·44	13·90	.....	17·20	2·13	10·48	1·05	14·55	1·58	13·77	1·55
Wisconsin No. 7 x Twitchell's Pride (Summerland)	.....	.....	1·00	.....	.....	.....	.....	.....	16·90	1·84	16·90	1·84
Yellow Dent	11·23	1·30	10·90	.....	14·57	2·05	.....	.....	8·17	0·89	11·22	1·41
Hybrid (Wimple)	13·32	1·82	16·60	.....	15·35	1·98	.....	.....	13·09	1·32	14·64	1·71
Dakota White Flint	.....	.....	.....	.....	.....	.....	.....	.....	14·56	1·67	14·56	1·67
North Western Dent (Wills)	.....	.....	.....	.....	.....	.....	.....	.....	12·92	1·39	12·92	1·39
Falconer	13·00	1·67	19·20	.....	15·86	1·97	10·27	1·27	10·46	1·57	13·76	1·62

The sunflowers were seeded on May 7 and were harvested on September 7. It will be seen that the Mammoth and Giant Russian types are by far the best yielders. The early maturing sorts are not as good yielders and are a much less satisfactory crop to handle both in the field and at the cutting box.

RESULTS OF VARIETY TESTS WITH SUNFLOWERS

Variety	Source	Stage of maturity	Height	Yield per acre green weight	Per cent dry matter	Yield per acre dry matter
			in.	tons		tons
Giant Russian	McKenzie	Five per-cent in bloom	80	18·88	12·84	2·42
Ottawa No. 76	Central Experimental Farm	Seed in medium dough	75	15·82	14·89	2·36
Mennonite	Experimental Station, Rosthern	Ripe	55	8·06	18·14	1·46
Mammoth Russian	McDonald	Five per-cent in bloom	79	18·15	12·01	2·18

RESULTS FOR FIVE YEARS

Variety	Source	Yield per acre											
		1925		1926		1927		1928		1929		Average	
		Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry	Green	Dry
		tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Giant Russian	McKenzie	.....	.....	.....	.....	.....	.....	.....	.....	18·88	2·42	18·88	2·42
Ottawa No. 76	Central Experimental Farm	20·14	2·08	12·70	.....	19·30	2·92	16·93	2·18	15·82	2·36	16·98	2·39
Mennonite	Experimental Station, Rosthern	12·90	1·80	9·90	.....	11·84	1·94	15·89	2·04	8·06	1·46	11·72	1·81
Mammoth Russian	McDonald	.....	.....	.....	.....	.....	.....	.....	.....	18·15	2·18	18·15	2·18
Mannoth Russian	Disco	31·72	2·94	14·70	.....	27·56	3·15	26·65	3·12	.....	.....	25·16	3·07
Manchurian	McKenzie	.....	.....	.....	.....	.....	.....	15·14	2·23	.....	.....	15·14	2·23

VARIETY TESTS WITH MANGOLDS

The yields produced by the different varieties of mangolds are given in the accompanying table. The Station has been using varieties of the oval and tankard type for their field crop. Mangolds seldom attain full maturity at Lacombe and it is possible this may explain the similarity of yields produced. Fall frosts usually occur before growth is completed, hence the yields produced are below par:—

VARIETY TESTS WITH MANGOLDS

Variety	Source	Yield per acre					
		1925	1926	1927	1928	1929	Average
		tons	tons	tons	tons	tons	tons
Yellow Intermediate	Cent. Exp. Farm	.....	.....	.....	.....	16·20	.....
Danish Sludstrup	Ewing	.....	.....	.....	.....	16·37	.....
Golden Tankard	Ewing	.....	.....	.....	.....	11·83	.....
Eckendorfer Red	Hartman	.....	.....	.....	.....	13·77	.....
Eckendorfer Yellow	Hartman	.....	.....	.....	.....	13·87	.....
Elvetham Mammoth	Hartman	.....	.....	.....	.....	11·41	.....
Fjeritslev Barres	Hartman	.....	.....	.....	.....	12·55	.....
Sludstrup Barres	Hartman	.....	.....	11·99	13·74	12·71	12·81
Stryno Barres	Hartman	18·02	19·10	13·83	14·62	15·45	16·20
White Red Top Half Sugar	Hartman	.....	.....	.....	.....	12·88	.....
Danish Sludstrup	McDonald	26·14	17·50	11·92	12·28	13·27	16·22
Giant Long Red	McKenzie	21·86	16·30	11·86	11·44	9·57	14·21
Yellow Intermediate	McKenzie	24·47	18·50	11·83	11·89	11·44	15·63
Giant White Feeding	Steele-Briggs	32·90	21·30	13·12	14·30	12·73	18·87
Giant White Sugar	Steele-Briggs	25·21	18·40	14·18	14·04	12·56	16·88
Giant Yellow Intermediate	Steele-Briggs	20·98	20·40	12·30	13·39	11·43	15·70
Giant Yellow Oval	Steele-Briggs	26·53	20·00	13·55	13·45	13·07	17·32
Golden Fleshed Tankard	Steele-Briggs	22·35	16·50	11·37	6·89	11·16	13·65
Prize Mammoth Long Red	Steele-Briggs	20·94	15·40	11·98	11·47	12·20	14·40
Royal Giant	Steele-Briggs	23·92	22·90	13·86	9·62	10·33	16·13
Barres Oval	Svalof	.....	.....	.....	.....	12·11	.....
Barres Half Long	Svalof	.....	.....	.....	.....	13·00	.....
Red Eckendorfer	Svalof	.....	.....	.....	.....	11·46	.....
Rubra	Svalof	.....	.....	.....	.....	13·21	.....
Yellow Eckendorfer	Svalof	.....	.....	.....	.....	12·55	.....

VARIETY TESTS WITH CARROTS

The results of variety tests with field carrots during the past four years are given in the accompanying table. Experience indicates that the intermediate type of carrot is the most satisfactory. The long types root so deeply that they are hard to harvest, and in addition they break in pulling to such an extent that yields are influenced. Carrots as a whole produce good yields if sown early on a rich sandy loam soil and, where the intermediate types are grown, are a nice crop to handle.

VARIETY TESTS WITH CARROTS

Variety	Source	Yields of roots per acre					
		1925	1926	1927	1928	1929	Average
		tons	tons	tons	tons	tons	tons
Improved Intermediate White	Duprey & Ferguson	.....	3·10	14·51	7·15	3·67	7·11
Champion	Hartman	3·95	3·30	12·62	6·20	2·47	5·71
White Belgian	Hartman	4·54	2·50	13·86	6·40	3·28	6·12
Improved Short White	Steele-Briggs	4·82	4·50	14·61	10·07	3·73	7·55
Large White Belgian	Steele-Briggs	.....	2·30	13·40	.....	3·99	6·56
Long Red Surrey	Steele-Briggs	3·34	3·50	10·15	4·31	3·12	4·88
Danish Champion	Central Experimental Farm	.....	4·30	13·96	9·52	2·86	7·66

VARIETY TESTS WITH SWEDES AND TURNIPS

The yields produced by fourteen varieties of Swedes and turnips which were seeded on May 8 are given in the accompanying table. Yields for the past five years are given. The average does not represent the full five years in the case of all varieties but is given to assist the reader in summarizing the data.

The Bangholm selections, and the Improved Yellow Swedish are among the best of the strains tested.

VARIETY TESTS WITH SWEDES AND TURNIPS

Variety	Source	Yields of roots per acre					
		1925	1926	1927	1928	1929	Average
		tons	tons	tons	tons	tons	tons
Bangholm	Ewing	17·73	22·60	.....	16·02	7·37	15·93
Bangholm Klank	Hartman	.....	.....	.....	.....	7·31	7·31
Mustiala	Hartman	.....	.....	.....	.....	8·00	8·00
Olsgaard Bangholm	Hartman	18·21	26·60	27·75	23·01	11·23	21·36
White Butter	Hartman	.....	.....	.....	.....	5·20	5·20
Breadstone	McKenzie	15·69	21·90	.....	17·42	3·64	14·66
Kangaroo	McKenzie	17·02	18·80	20·44	17·42	7·78	16·29
Monarch	McKenzie	18·38	18·60	.....	16·44	7·95	15·34
Ditmars	McNutt	.....	.....	.....	.....	8·98	8·98
Bangholm	Experimental Farm, Nappan	.....	20·60	.....	16·02	7·78	14·80
Goodluck	Steele-Briggs	16·83	6·60	17·94	15·73	7·21	12·86
Selected Purple Top	Steele-Briggs	17·56	10·10	15·60	17·55	7·45	15·45
Selected Westbury Purple Top	Steele-Briggs	21·41	17·00	16·77	17·48	7·78	16·09
Purple Top	Central Experimental Farm	.....	.....	.....	21·12	13·55	17·34
Bangholm	General Swedish Seed Co	18·45	25·80	.....	20·73	13·47	19·61
Improved Yellow Swedish	General Swedish Seed Co	22·55	27·30	.....	22·38	11·27	20·88

VARIETY TESTS WITH SUGAR BEETS

In the sugar beet tests the Fredericksen variety produced 4·76 tons of roots carrying 19·15 per cent sugar, the Horning variety gave 4·74 tons of roots with 18·01 per cent sugar, and the Rabbethage and Giessecke variety produced 4·35 tons with 17·72 per cent sugar. The yields of roots, and sugar content are not as high as the soil and climate would lead one to anticipate. Results from this Station have not indicated favourable possibilities for the growing of beets for factory purposes.

HORTICULTURE

The season of 1929 was very unfavourable for horticultural work. The dry weather which prevailed during the growing season resulted in a very uneven germination of seeds, etc., thus making experimental results for 1929 of relatively small value. In view of these conditions, it seemed that greater benefits might result from the publication of a list of approved varieties of the different horticultural crops, than from the publication of the 1929 results in detail.

VARIETIES OF STANDARD VEGETABLES RECOMMENDED

Artichoke	Red or White.
Asparagus	Washington, Palmetto, Reading Giant.
Beans Wax	Wax, Golden Wax, Davis White Wax, Langport Wonder.
Beans Dwarf	Green, Masterpiece, Refugee, Valentine.
Beans Runner	Prize Winner, Painted Lady, Best of All.
Beets	Flat Egyptian, Eclipse, Detroit Dark Red.
Broccoli	Walchren.
Brussels Sprouts	Paris Market, Dalkeith.
Cabbage early	Early Jersey Wakefield, Copenhagen Market, Early Paris.
Cabbage late	Flat Swedish, Danish Ballhead.
Carrot	Chantenay, Danvers Half Long, Nantes, Short Horn.

VARIETIES OF STANDARD VEGETABLES RECOMMENDED—*Conc.*

Cauliflower	Snowball, Dwarf Erfurt.
Celeriac	Large Smooth Prague.
Celery	Paris Golden, White Plume, Golden Self Blanching.
Chives	Common.
Citron	Red Seeded, Colorado.
Corn	Golden Bantam, Sunshine, Pickaninny.
Cucumber	For outdoor growing, Long Green, Davis Perfect, Giant Pera.
Cucumber	For greenhouse, Telegraph.
Dandelion	French Improved Thick-leaved.
Egg Plant	Extra Early Dwarf.
Endive	Moss curled.
Horse Radish	Bohemian.
Kale	Dwarf Scotch.
Kohl Rabi	Purple Vienna, White Vienna.
Lettuce Head	Big Boston, Iceberg, Wonderful, Leaf Lettuce, Grand Rapids, Hanson.
Lettuce Cos	Trianon Cos., Paris White.
Muskmelon	Hearts of Gold, Golden Champlain.
Mustard	English White.
Onion	Southport Yellow Globe, Red Wethersfield, Spanish White.
Parsley	Champion Moss Curled, Triple Curled.
Parsnip	Hollow Crown, Student.
Peas	American Wonder, Gradus, Thomas Laxton (late) Stratagem.
Peppers	Bull Nose, Ruby King, Large Long Red.
Potatoes	Early Ohio, Irish Cobbler, Gold Coin.
Pumpkin	Connecticut Field, Small Sugar.
Radish	Scarlet Turnip, French Breakfast, White Icicle.
Rhubarb	Ruby, Victoria, Linneaus.
Salsify	Mammoth Sandwich Island, Long White.
Squash	Green Hubbard, Golden Hubbard, Long White Marrow, Bush.
Spinach	Victoria, New Zealand, King of Denmark.
Swiss Chard	Lucullus, Silver Leaf.
Tomato	Earliana, Bonny Best, Alacrity, Canadian.
Turnip	Snowball, Golden Ball, Strapleaf
Watermelon	Cole Early, Peerless.

VEGETABLE PLANTING TABLE

This planting table for vegetables is based on results at Lacombe, local conditions may vary this to some extent

Vegetables	Seeds or plants necessary for 100-foot row	Time for planting out of doors or greenhouse	Depth to to plant	Distance between rows	Distance between plants in rows
Artichokes	10 pounds	April	3 inches	3 feet	2½ feet.
Asparagus seed	1 ounce	May to June	½ inch	3 feet	1 inch apart.
Asparagus roots	50 plants	May to June	8 to 10 inches.	3 feet	2 feet.
Beans bush	1 pint	May to June	1½ to 2 inches.	3 feet	2 inches apart.
Beets	2 ounces	May to July	½ inch	3 feet	2 inches.
Brussels Sprouts	¼ ounce	April, transplant as soon as ready	¼ to ½ inch	2 feet	18 inches.
Cabbage Early	¼ ounce	April to May, transplant as soon as ready	¼ to ½ inch	3 feet	2 feet.
Cabbage Late	¼ ounce	AprilttoMay, transplant as soon as ready	¼ to ½ inch	18 inches	3 inches.
Carrot	½ ounce	April to July	¼ to ½ inch	3 feet	2 inches.
Cauliflower	¼ ounce	April to May	¼ to ½ inch	4 feet	6 inches.
Celery	¼ ounce	February to March in boxes	⅛ inch	6 feet	4 inches.
Citron	1 ounce	April to May	1 inch	4 feet	4 feet.
Corn	¼ pint	April to May	2 inches	4 feet	4 feet.
Cucumbers	½ ounce	May to June	1 inch	2 feet	1½ feet.
Egg Plant	⅓ ounce	March to April in boxes	½ inch	3 feet	2 feet.
Kale	¼ ounce	May	½ inch	18 inches	6 to 8 inches apart
Kohl Rabi	¼ ounce	April to May	½ inch	2 feet	6 inches apart.
Leeks	½ ounce	April	½ inch	18 inches	6 to 8 inches.
Lettuce	¼ ounce	First sowing as soon as frost is out of the ground	¼ inch	4 feet	2 feet.
Melon Musk	½ ounce	April in boxes	1 inch	4 feet	4 feet.
Melon Water	1 ounce	May	1 inch	18 inches	2 inches.
Onion seeds	½ ounce	First sowing as soon as frost is out of the ground	½ inch	18 inches	2 inches.
Onion sets	2 quarts	April	1½ inches	18 inches	8 to 10 inches.
Parsley	¼ ounce	As soon as frost is out of the ground	¼ inch	18 inches	1 inch.
Parsnip	1 ounce	As soon as frost is out of the ground	1 inch	18 inches	3 to 4 inches.
Peas	1 quart	As soon as frost is out of the ground	2 to 3 inches	4 feet	peas, 1 inch apart.
Pepper	½ ounce	March to April in boxes	½ inch	2 to 2½ feet.	15 to 18 inches.
Potatoes	10 pounds	May to first week in June	4 to 6 inches	2 to 3 feet	1 foot.
Pumpkin	½ ounce	May	1 to 1½ inches	6 feet	6 feet.
Radish	1 ounce	April to September	½ inch	18 inches	¼ to 1 inch.
Rhubarb	33 plants	April to September	2 to 3 inches	2 to 3 feet	2 to 3 feet.
Salsify	1 ounce	April to May	½ inch	18 inches	3 to 4 inches
Spinach	1 ounce	March to July	½ to 1 inch	18 inches	2 to 3 inches.
Squash or Marrow	½ ounce	First week in May	1½ inches	4 to 6 feet	4 to 6 feet.
Squash Hubbard	½ ounce	First week in May	1½ inches	4 to 6 feet	4 to 6 feet.
Tomato	50 to 75 plants	June	3 to 4 inches	3 feet	1 to 3 feet.
Turnip	½ ounce	April to July	¼ to ½ inch	18 inches	4 inches.

FLOWERS

A large number of flowers have been tested at the Station. The different flowers are classified according to the method followed in their propagation. Group No. 1 includes hardy annuals seeded directly in the open, early in the spring. Group No. II includes half hardy annuals which require some shelter before planting out or those which are usually started in cold frames. No. III includes those annuals which require some heat to germinate but which germinate and grow quickly, and which are usually sown in hot beds early in April. No. IV includes the annuals which germinate and grow slowly and need to be seeded early in a greenhouse in March. No. V includes perennials that withstand the winter and live from year to year without renewing.

GROUP I

Flowers sown in the open early in the spring. Those marked with an asterisk stood the drought in 1929 better than the others.

Variety	Remarks
*Bartonia aurea	Very free flowering, easily grown, yellow.
*Linaria	A dainty flower, delicate colours, like a miniature Snap-dragon.
*Candytuft	White, pink and lilac, profuse bloomer.
Pansies	Very hardy, flowers very early and late.
Shirley Poppies	Delicate single colours, mostly shades of scarlet, pink and rose.
*Eschscholtzia	California Poppy, profuse bloomer, colours buff, yellow, scarlet and pink.
*Phacelia	Very early flowering, very bright blue.
*Calendula	Pot Marigold, fine for decorating, remaining fresh a long time after cutting.
Blue Lace Flowers	Not very hardy, cambridge blue flowers.
*Asperula	Very free blooming, rather short season.
Gypsophila	Baby's Breath, white star flower, used for bouquets.
Oxalis	Clover shaped leaves, small yellow bloom.
Princess Feather	Suitable for back ground, large feathery flower.
*Love-in-a Mist	Pretty blue flower set in slender elegant foliage.
*Love-lies-bleeding	Attractive back ground plant, with long drooping crimson flowers.
*Chrysanthemum	Like large single daisies, many different colours.
*Cornflower	or Bachelor's Buttons, very hardy, many colours.
Coreopsis	Small graceful flowers, colours, bronze, yellow, brown and red.
*Godetia	Makes an effective display, the taller varieties are very decorative.
*Lavatera	or Mallows, extremely showy, colours, white, pink and rose.
Lupinus	Long showy spikes, pink, white, yellow and blue.
Night Scented Stock	Lilac flowers, exquisite perfume profusely exhaled in the evening.
Virginia Stock	Small dwarf plants, profuse bloomer.
*Clarkia	Like small miniature roses on long spikes, colours rose white and pink.
*Portulaca	Commonly known as the ground rose. Foliage covers the ground like a creeper.
Sweet Sultan	Fine feathery flower, very decorative.
Sweet Peas	One of the best flowers, many colours, sweet perfume.
Hibiscus	A spotted flower, cream colour with dark spots on it.

GROUPS II, III AND IV

Flowers sown in the greenhouse, hot beds, and cold frames during 1929. An asterisk marks those that withstood the drought best. Those belonging to Group II were sown in the cold frames, those belonging to Group III were sown in hot beds, those belonging to Group IV were sown in the greenhouse.

Variety	Where sown	Date sown	Remarks
*Alyssum	Cold frame	April 6	Dwarf edging plant, looks like a carpet of snow.
*Antirrhinum	Greenhouse	Mar. 12	Hardy annual, one of the best bedding plants, many beautiful colours.
*Aster	Cold frame	May 4	Grown for late fall use, very fine for cut flowers, and decorations.
*Dianthus	Greenhouse	Mar. 12	Very hardy annual. Some time coming through the winter. Some of the plants are very fine.
*Dimorphotheca	Cold frame	May 4	Stands quite a lot of frost, better known as South African Daisy.
*Helichrysum	Hotbed	April 6	Everlasting flowers, useful for winter decoration.
*Larkspur	Cold frame	May 4	A miniature Delphinium, good for late decoration.
Marigold	Hotbed	April 23	Will not stand any frost, colours, bronze, yellow and amber.
*Mignonette	Cold frame	May 4	Sweet scented annual, useful for bouquets.
Nicotiana	Hotbed	April 6	Suitable for back ground, sweet scented.
Pansy	Greenhouse	Mar. 12	Very hardy, sometimes lives through the winter, continuous bloomer.
*Petunia	Greenhouse	Mar. 18	Very useful for bedding, very free blooming, colours, white, pink, blue and mauve.
Nemesia	Hotbed	April 6	Beautiful dwarf growing annual, flowers look like velvet, exquisite colouring.
*Phlox	Greenhouse	Mar. 12	Hardy, a beautiful combination of colours, blooms from early summer until fall.
Schizanthus	Greenhouse	Mar. 12	Butterfly Flower, resembles a miniature orchid fine for decoration.
*Stocks	Cold frame	Mar. 12	Hardy annual, very showy, brilliant colours, and sweetly perfumed.
*Tagetes	Cold frame	May 4	Fine edging plant, catches the frost quickly.
Zinnia	Hotbed	April 6	Will not stand the frost, they make a gorgeous display, many varieties and colours.
*Ageratum	Hotbed	April 6	A dainty blue edging plant, free bloomer.
*Acroclinium	Cold frame	May 4	Everlasting flower, resembles a small daisy.
Arctotis	Cold frame	May 4	Very peculiar colour, a bluish gray colour.
Balsam	Hotbed	April 6	Very delicate, colours white, pink and red.
Carnation	Greenhouse	Mar. 12	Two varieties that bloom the same year as sown.
Cosmea	Hotbed	April 6	Good for a back ground, large daisy flower, white, pink and crimson.
Globe Amaranth	Cold frame	May 4	Used for winter flowers when dried.
*Kochia	Hotbed	April 6	Mexican Burning Bush, used for a dot plant, leaves turn brilliant red in fall.
Lobelia	Greenhouse	Mar. 12	Will not stand any frost, very fine edging plant.
Salpiglossis	Hotbed	April 6	Exquisite colouring, showing different coloured veins.
Statice	Hotbed	April 6	Fine everlasting flower, many varieties of colours.
Verbena	Greenhouse	Mar. 18	Clusters of small starlike flowers, creeping on ground.

GROUP V—PERENNIALS

Botanical name	Common name	Remarks
**Aquilegia*	Columbine	Very hardy beautiful flowers, known as the poor man's orchid.
Aconitum Napellus	Monkshood	Hardy, late flowering, different shades of blue.
Campanula latifolia	Bellflower	Partly winter killed, bell shaped flowers.
Centaurea montana	Knapweed	Winter killed, not always hardy.
**Delphinium in variety*	Larkspur	Very hardy, long spikes of many shades of blue.
Doronicum magnificum	Leopards Bane	Flowers very early, large yellow daisy.
**Dianthus deltoides*	Maiden Pink	Beautiful edging plant or rock plant.
Dicentra spectabilis	Bleeding Heart	Comes through winter well, a great favourite.
**Chrysanthemum coccineum*	Pyrethrum	Single and double flowers, very useful for cutting, hardy.
Dictamnus fraxinella	Gas Plant	Named because of its peculiar smell, not so hardy.
Eyrngium alpinum	Sea Holly	Very curious thistle like flower, blue.
Gaillardia grandiflora	Blanket Flower	This flower has many different hues.
**Gypsophila paniculata*	Baby's Breath	Very hardy, useful for decorating.
Helianthus multiflorus	Sunflower	Perennial sunflower, single and double.
Helenium hoopesi	Sneezewort	Winter kills some seasons.
**Hemerocallis middendorfii*	Day Lily	Very hardy, lovely tints of lemon, buttercup yellow.
**Iris in variety*	Flag	Flowers do not last very long, beautiful colours.
**Lilium tigrinum*	Tiger Lily	Very hardy, lovely orange lily, flowers late in season.
Lilium regale	White Lily	Beautiful white lily, winter kills after several years.
**Lychnis chalcedonica*	Jerusalem Cross	Very hardy, brilliant scarlet flowers.
**Paeonia*	Paeony	Very hardy, one of the showiest of all perennials.
Papaver orientale	Oriental Poppy	Winter kills some years, giant poppy.
Platycodon grandiflorum	Chinese Bell Flower	Winter kills some years, useful for winter decorations.
Polemonium caeruleum	Jacob's Ladder	Very hardy flowers, white and purple.
**Papaver nudicaule*	Iceland Poppy	Hardy, very early and very late flowers.
Phlox paniculata	Phlox	Winter killed, very beautiful flower, large heads.
**Hesperis matronalis*	Sweet Rocket	Very hardy, small purple and white flowers.
Spiraea astilboides	Spiraea	Large heads of creamy white flowers.
Rudbeckia laciniata flore pleno	Golden Glow	Hardy, late flowering yellow blooms.
**Thalictrum adiantifolium*	Meadow Rue	Very hardy, useful for decorating.
**Veronica spicata*	Speedwell	Very hardy, long thin white and blue spikes.

*Those which best withstood the drought of 1929.

ROSES

A large number of roses have been grown during the past few years. Some eighty-five different varieties are under test at present. Experience with the different varieties indicates that they may be divided into four degrees of hardiness: The first degree of hardiness includes the Rugosa and Briar roses; the second degree includes the Polyantha and the Austrian Briar; the third degree includes the Hybrid Perpetuals and the Wichuraiana; and the fourth degree includes the Hybrid Tea roses.

Winter protection or covering is a very important factor in rose production. The method followed at the Station is as follows: The branches are gathered together and bent over and held down by a V-shaped wooden trough made from two boards nailed together; this trough is then covered with long strawy manure. The use of the wooden trough provides an air space and prevents, to a large extent, the development of mildew which destroys a large number of canes where the manure comes in direct contact with them.

ORNAMENTAL SHRUBS RECOMMENDED FOR CENTRAL ALBERTA

Botanical name	Common name	Remarks
Cotoneaster tomentosa	Rockspray	A beautiful shrub, white flowers in spring covered with red berries in fall.
Cotoneaster frigida	Rockspray	Foliage leaves a beautiful colour in fall, white, flowers, red berries in fall.
Cotoneaster vulgaris	Rockspray	Grows upright, pinkish flowers, berries black in fall.
Caragana pygmaea	Dwarf Siberian Pea Tree	Makes a fine dwarf hedge or individual shrub, large yellow flowers.
Caragana frutescens	Siberian Pea Tree	Large yellow blooms hangs down like a fruit.
Caragana arborescens	Siberian Pea Tree	Makes one of the finest hedges, quick grower.
Syringa vulgaris	Common Lilac	Very sweet scented, long purple spikes.
Syringa villosa	Chinese Lilac	Very showy, profuse bloomer.
Syringa josikaea	Josika Lilac	Late variety, long slender spikes.
Syringa amurensis	Manchurian Lilac	Large clusters or panicles of creamy white flowers, the last lilac to bloom.
Lonicera tatarica	Tartarian Honeysuckle	Flowers, pink, white and red, turning to bright berries in the fall.
Lonicera Chrysantha	Coralline Honeysuckle	Flowers, red, white and pink, bright red berries in the fall.
Spiraea Van Houttei	Van Houtte Spirea	A beautiful shrub with masses of white bloom in spring.
Spiraea Billardii	Billard's Spirea	Long pink spikes, very hardy, tall growing variety.
Spiraea japonica	Japanese Spirea	Grows to 4 feet high, very hardy, small white to pinkish variety.
Spiraea sorbifolia	Meadow Sweet	One of the hardiest and vigorous growers, spikes white and large.
Spiraea arguta	Garland Spirea	Very delicate, long white spikes, very beautiful.
Rosa spinosissima Altaica	Rose	Beautiful single yellow rose, perfectly hardy.
Rosa rubrifolia	Rose	Grown mostly for its red foliage, very fine in shrubberies.
Rosa rugosa	Japanese Rose	Hardy pink rose, single and double.
Philadelphus Lemoinei	Mock Orange	Partly winter kills, very fragrant, resembling Orange Blossom.
Prunus grayana	Bird Cherry	A fine tree, hardy, long white spikes, very early.
Pyrus Aucuparia	Mountain Ash	A beautiful tree having bunches of red berries in fall.
Acer tatarica	Ginnalian Maples	Foliage is very beautiful throughout season.

NATIVE SHRUBS RECOMMENDED FOR CENTRAL ALBERTA

Botanical name	Common name	Remarks
Elaeagnus argentea	Silver Willow or Wolf Willow.	A beautiful silver leaved shrub, very fragrant.
Amelanchier alifolia	Saskatoon	Covered in white flowers in spring, having an edible berry.
Rhamnus catharticus	Buckthorn	Makes a good hedge or individual shrub.
Potentilla	Cinquefoil	A small dwarf compact shrub, with bright yellow flowers.
Viburnum opulus	Highbush Cranberry	Has bunches of white bloom in spring, berries make good jelly.
Shepherdia argentea	Buffalo Berry	Beautiful silver leaved shrub, edible berries in fall.
Salix voronesh	Golden Willow	The twigs have a golden appearance.
Sorbus	Mountain Ash	Very graceful having bunches of scarlet berries in the fall.

HEDGES RECOMMENDED FOR CENTRAL ALBERTA

Botannical name	Common name	Remarks
Caragana arborescens	Siberian Pea Tree	One of the best for a quick hedge.
Caragana pygmaea	Dwarf Siberian Pea Tree	Very fine for a dwarf hedge.
Elaeagnus argentea	Wolf Willow or Silver Willow.	Beautiful silver leaves, very fragrant.
Lonicera tatarica	Tartarian Honeysuckle.	Very pretty but rather open.
Picea candensis	Native White Spruce	The best evergreen hedge.
Pinus contorta Murrayana	Lodgepole Pine	Evergreen hedge, rather coarse and open.
Rhamnus catharticus	Common Buckthorn	Slow growing, if pruned hard would make a dense hedge.
Salix pentandra	Laurel-leaved Willow	Makes a beautiful hedge with a fine sheen, sometimes winter kills.
Shepherdia argentea	Buffalo Berry	One of the best, silvery leaves, bright berries in the fall.
Syringa villosa	Chinese Lilac	Hardy, quick growing, makes a good hedge.
Acer tatarica	Ginnalian Maple	Very beautiful, but sometimes winter kills.

DECIDUOUS TREES RECOMMENDED FOR CENTRAL ALBERTA

Botannical name	Common name	Remarks
Populus nigra	Black Poplar	Rapid grower, good shape, holds its leaves a long time in fall.
Populus petrowskiana	Russian Poplar	Very vigorous, quick growing, suitable for windbreaks.
Ulmus americana	American Elm	Hardy, fine shade tree, slow growing.
Acer negundo	Manitoba Maple	Suitable for planting in inter-spaces for windbreaks.
Betula alba	Silver Birch	Native tree, very graceful.
Populus candicano	Native Balm or Balm of Gilead.	Very hardy and quick grower.

EVERGREEN TREES RECOMMENDED FOR CENTRAL ALRERTA

Botannical name	Common name	Remarks
Picea pungens	Blue Spruce	Very hardy, beautiful trees.
Picea canadensis	Native White Spruce	Very hardy, also fine for hedges.
Picea mariana	Black Spruce	Strong and vigorous, quick grower.
Picea excelsa	Norway Spruce	Only partly hardy, very fine needles.
Pinus contorta Murrayana	Lodgepole Pine	One of the hardiest pines.
Pinus sylvestris	Scotch Pine	Hardy, good specimen tree.
Pinus Banksiana	Jack or Banksian Pine	Common native pine.
Pinus montana Mughus	Dwarf Mountain Pine	Very useful as a dwarf specimen.
Pinus Strobus	White Pine	Not so hardy as some varieties.
Larix leptolepis	Japanese Larch	Very beautiful tree, graceful.
Pseudotsuga (Douglasi)	Douglas Fir	Only partly hardy.

TREE AND BUSH FRUITS RECOMMENDED FOR CENTRAL ALBERTA

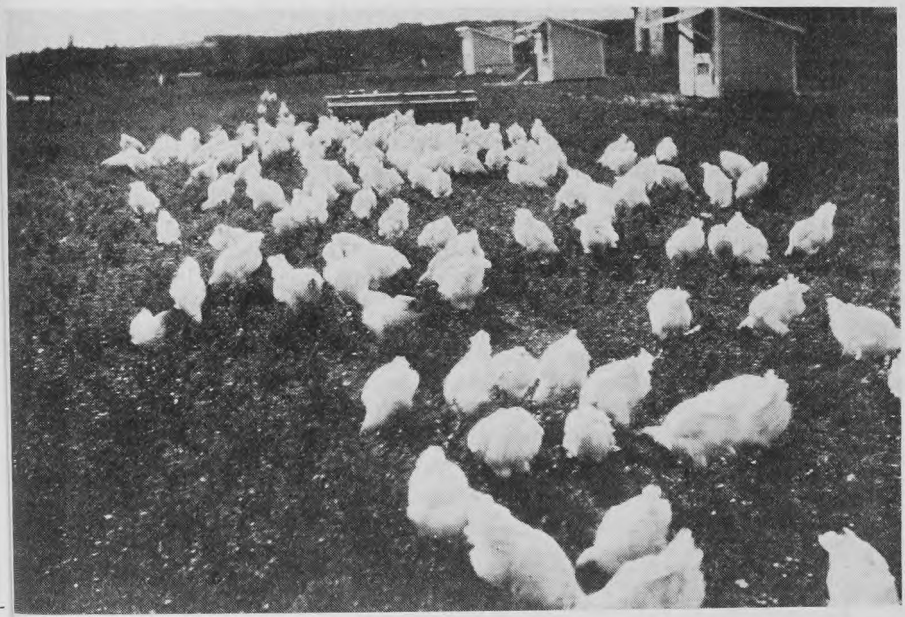
Apples.—Hibernal, Anoka, Duchess of Oldenburg, Patten Greening.
Crabs.—Elsa, Antonovka, Siberian.
Plums.—Opata, Sapa, Hanska, Assiniboine, Cheney.
Cherry.—Compass, Tom Thumb, Sand Cherry.
Red Currants.—Red Dutch, Perfection, Fay Prolific, Red Grape.
White Currants.—White Grape.
Black Currants.—Kerry, Black Naples, Black Champion.
Gooseberries.—Houghton, Carrie.
Raspberries.—Herbert, Cuthbert, St. Regis.
Strawberries.—Senator Dunlap, Everbearing Champion, Everbearing Mastodon.

Currants, raspberries and strawberries have given very good results at this Station, and can be recommended either for gardens or for growing on a small commercial scale. None of the tree fruits have given satisfactory results and they can be recommended only for trial in small numbers and where there are exceptionally favourable conditions of moisture and shelter.

POULTRY

At the conclusion of 1929 the Station flock, consisting entirely of White Wyandottes, numbered two hundred and fifty-three birds, including forty-eight hens, one hundred and twenty-one pullets and eighty-four male birds, most of which are cockerels which will be sold to farmers for breeding.

As outlined in our previous reports, special attention is given to pedigree breeding, the object being to demonstrate the possibilities of establishing a flock with higher average egg production and at the same time to maintain good breed type, fertility, hatchability and large eggs. The selection of males, which were from hens having produced large-sized eggs was continued this year and has already shown an improvement in the average egg size of the entire flock. All birds are trap-nested and each bird's identity is retained by the use of leg and wing bands.



White Wyandotte cockerels on alfalfa range, July 30.

In the fall of 1929 the entire flock, consisting of males kept for breeding purposes, pullets and adult females, was tested for bacillus pullorum. Pullorum, as well as producing white diarrhea in chicks, is the cause of an infection of the ovary in hens. The disease in breeding stock presents a serious problem because some of the eggs laid by such fowls carry the infection and transmit it directly to chicks hatched from them. Infection from this source is the most common cause of the start of outbreaks among chicks. The results of the test showed that of the two hundred and thirty-four birds tested there were only nine reactors. Of the two hundred and eighty-two birds tested the previous year there were forty-one reactors. The nineteen males tested came through

one hundred per cent clean. Of the forty-eight hens tested, three reacted or 6·25 per cent; of the 167 pullets tested, 6 reacted or 3·5 per cent. All the reactors were disposed of immediately following the test.

METHODS OF FEEDING

Grain is fed in the litter both morning and evening. The morning feed is a light one to keep the hens scratching most of the morning thus inducing exercise. The evening feed of scratch grain is sufficient to have the birds go to roost with full crops. The standard grain mixture of "scratch feed" in use is composed of 2 parts wheat, 1 part oats and 1 part corn. Corn is included because it is very palatable and one of the best grains to maintain body weight during the months that the birds are confined. In summer rather less corn is fed. The dry mash which is available in hoppers at all times is made up of the following:—

100 pounds bran,
100 pounds middlings,
100 pounds corn meal,
100 pounds oat flour,
90 pounds meat scraps,
15 pounds bone meal,
5 pounds fine salt,
5 pints cod liver oil.

These feeds are varied at times. Ground barley has been used in the place of the corn with good results. It should be stated that when a regular supply of milk is available the meat scrap may be omitted. During the season of the year when there is plenty of sunshine and green feed the cod liver oil is not fed.

A moist, crumbly mash of the same formula as that fed dry, is fed at noon to increase the amount of mash consumed. The amount fed is about as much as the birds will eat in about fifteen minutes. Grit and oyster shell are available in hoppers, and green feed is supplied either by alfalfa leaves or mangels, cabbage and sprouted oats. A liberal supply of greenfeed fed daily during the winter months provides the birds with the required succulence in the ration, tends to keep them in better physical condition and thus promotes egg production.

HATCHING RESULTS

Artificial incubation is employed for all hatching. The results for the season were as follows:—

Total eggs set	3,899
Number fertile	2,226
Per cent fertile	57·1
Number of chicks	1,123
Per cent total eggs hatched	28·8
Per cent fertile eggs hatched	50·4
Number of chicks alive when wing-banded	700
Per cent chicks hatched, alive when wing-banded	62·3
Total eggs required for 1 chick hatched	3·5
Total fertile eggs for one chick hatched	2·0
Total eggs required for 1 chick when wing-banded	5·6

The hatching results from hens and pullets were as shown in the following table:—

HATCHING RESULTS FROM HENS AND PULLETS

—	Hens	Pullets
Total eggs set	1,329	2,570
Number fertile	885	1,441
Per cent fertile	66·5	56·1
Number of chicks	511	612
Per cent total eggs hatched	46·8	23·4
Per cent fertile eggs hatched	57·7	42·5
Number of chicks alive when wing-banded	392	308
Per cent chicks hatched alive when wing-banded	76·7	50·3
Average number eggs required for one chick hatched	2·6	4·1
Average number fertile eggs for one chick hatched	1·7	2·3
Average number eggs required for one chick when wing-banded	3·4	8·3

NOTE:—The fertility, hatchability and viability of chicks indicate the value of old hens over pullets as breeders.

BEST DATE FOR INCUBATION

The records of this experiment for the past four years, indicate that the best hatching results are obtained from March to early May, and that it is not advisable to hatch chicks after the end of May. The mortality in June hatched chicks is very high at this Station, partly for the reason that in very warm weather it is impossible to properly regulate the brooder temperatures. June hatched chicks also lack vitality and are unsatisfactory as layers. The total eggs required for one chick when wing-banded was 4·4, 4·3 and 5·4 respectively in March, April and May, while in June the large total of 12·6 was required.

FEEDING INVESTIGATIONAL WORK

The experimental work during the year consisted chiefly of comparing feeds and feed mixtures for laying pullets during the winter.

CORN VS. BARLEY FOR LAYERS

An experiment has been conducted for five years for the purpose of determining if barley is a satisfactory substitute for corn in the grain ration of laying pullets for winter egg production. Two equal groups of pullets were housed and cared for in the same manner. The grain feeds in one pen were the standard scratch and the standard mash, both containing considerable corn, while in the other pen the corn was left out of the scratch and mash and barley and barley meal substituted. The scratch feed was fed in the litter and the mash was fed dry in a hopper and was always available. Alfalfa was given as green feed and they had free access to grit and water. This experiment is conducted from November to May and the results of the 1928-29 feeding test, also a five-year average are given in the following table:—

CORN VS. BARLEY FOR LAYERS

Feeds under test	Total eggs laid	Total feed cost	Value of eggs	Average eggs per bird	Cost per dozen	Cost per bird	Profit over feed cost	Profit per bird over feed cost
		$	$		cts.	$	$	$
Corn	547	8 43	16 41	54·7	18·5	0 843	7 98	0 798
Barley	483	6 48	14 49	48·3	16·1	0 648	8 01	0 801
Four-year average, basis of 10 birds:								
Corn	622	12 48	18 66	62·2	24·1	1 248	6 18	0 618
Barley	553	9 44	16 59	55·3	20·5	0 944	7 15	0 715

The preceding table shows that the birds receiving the corn in the rations produced considerably more eggs but on account of the high cost of the corn as compared with barley the cost per dozen of eggs produced was on the average 3·6 cents in favour of the barley-fed pen. The increased egg production in the corn-fed pen was not sufficiently large to counterbalance the additional feed cost of the ration.

BUTTERMILK VS. BEEF SCRAP

Two pens of White Wyandotte pullets were used in an experiment lasting from November 1 to April 30, with the object of comparing buttermilk with beef scrap as a source of animal protein for winter egg production. The ration given to each pen was the same with the exception of the buttermilk and beef scrap. In this experiment the beef scrap produced slightly better results than the buttermilk from the standpoint of egg production. These results are in accord with those obtained from a similar test conducted from November 1, 1926 to April 30, 1927.

Other experimental projects with poultry were under way and reports of these will be made as the data warrant.

BEES

The weather during the season of 1929 was not at all satisfactory for bee-keeping, being exceptionally dry and windy, with the result that bloom was very scarce and the high winds made it difficult for the bees to collect pollen and nectar.

The honey produced was gathered from a great variety of bloom and as a result was a blend of many flavours. It was unusual for its density and the remarkably short time it took to crystallize.

The bees were removed from winter quarters on March 1, and started brood rearing during the latter part of the month. Cellar-wintered colonies were quite strong when removed from the cellar but dwindled badly before May 1. This dwindling was probably caused by the uneven temperatures which prevailed during March and April.

Pollen was available from willow on April 24 and from dandelion on May 10 to 20. The main flow started about July 12 and was of very short duration. The highest yield for one colony was 122·5 pounds and the highest daily gain was made on July 19 when the hive on the scales increased 10 pounds in weight.

OVER-WINTERED VS. PACKAGE BEES

The object of this experiment is to determine the relative value of over-wintered versus package bees as honey producers. Ten two-pound packages of bees were received on May 10, some being placed on drawn combs and some on new foundation. These colonies made an average production of 34·3 pounds of honey and built up into good strong colonies for over-wintering. Ten colonies of cellar-wintered bees, which were removed from the cellar on March 12, gave an average production of honey of 32·9 pounds per colony.

WINTER PROTECTION

The object of this experiment is to determine what method of wintering bees is most satisfactory. Two colonies that were wintered in single Kootenay cases produced an average of 74·7 pounds of honey; four colonies that were wintered in double packing cases produced an average of 77·0 pounds of honey from three colonies, the fourth being disposed of before the completion of the

season; twenty colonies that were wintered in quadruple (4 colony) wintering cases produced an average of 64·0 pounds of honey from eleven colonies, nine of this group were disposed of; twenty colonies placed in the office basement on November 11 gave 15 strong spring colonies and an average production of 45·0 pounds of honey per colony. It will thus be seen that outside wintering was decidedly more satisfactory than cellar wintering. It is difficult to explain the difference in the yields produced by the different outside wintered colonies.

COMPARISON OF RACES OF BEES

This experiment was started in 1926, the three races being compared are Italians, Carniolans, Caucasians. The results obtained in this experiment in 1929 are summarized in the following table.

COMPARISON OF RACES OF BEES

Race	Approximate strength at first examination in spring	Approximate strength at first examination at beginning of flow	Approximate strength for winter	Honey produced
				lb.
Italians	7½ frames	20 frames	7	111
Carniolans	8 frames	19½ frames	6	113
Caucasians	6½ frames	14½ frames	7	61

There were two colonies of each race in this experiment. All colonies started out fairly evenly in the spring with one colony of Caucasians slightly weaker than the others but these built up as strong as the other colonies by the end of the season.

Both Carniolans and Caucasians were very persistent in raising queen cells and preparing to swarm even after being manipulated to control swarming; on the other hand, the Italians made practically no preparation for swarming. While the Carniolans gave a slightly higher yield of honey, they were much more difficult to handle than the Italians and required much more supervision to prevent swarming.

PROTECTED VERSUS UNPROTECTED HIVES DURING SUMMER

In this experiment, colonies with the brood nest and supers protected are compared with colonies with the brood nest only protected, and colonies with no protection other than the natural protection provided by windbreaks. Two colonies were used in each treatment. Where the brood chamber only was protected, a Kootenay case was placed around the brood chamber and the space between the hive and brood chamber packed with cut straw, the other supers being left without protection. When the whole colony was protected, a lift was added to the case with each super. The unprotected colonies were given no protection other than that provided by excellent wind breaks and natural surroundings.

RESULTS FROM PROTECTED AND UNPROTECTED HIVES

Protection	Frames covered by bees in spring	Frames covered at first of main flow		Swarming	Yield of honey
		Bees	Brood		
					lb.
Kootenay case	5	18	8	No	73·5
"	2-lb. package	12	8	No	88·5
Protected Brood Nest	9	10	8	No	18·5
" "	7	12	8	Supersedure	Nil
Unprotected	2-lb. package	11	8	No	40·0
"	8	16	8	Yes	71·5

It will be observed that the colonies protected by Kootenay cases gave the best results as emphasized by the two pound package placed in the Kootenay case which gave a higher yield than any of the over-wintered colonies. For some reason the colonies with the brood chamber only protected did not do as well as one would expect. As a rule this treatment gives results almost equal to the fully protected colonies. It is possible that the low yield might be attributed to lack of prolificacy in the queens.

PREVENTION AND DETECTION OF SWARMING BY MANAGEMENT

This season's results with this experiment substantiate those of previous years in that the shallow supers used on most of the colonies facilitate detection of swarming as indicated by the production of queen cells on the bottoms of the frames of the shallow supers.

With one exception (a colony of Caucasians) queen cells were always found on the bottom of the shallow frames by tipping the shallow supers. When queen cells were found, the colony was manipulated in different ways. Some colonies had the frames containing young brood raised to an upper super with a queen excluder placed between the super and the brood chamber; the queen being left in the brood chamber which had drawn combs added. The second manipulation consisted of requeening. A young queen was introduced and the old queen removed to another hive. Both these methods proved effective with Italians but the Carniolans and Caucasians were more difficult to control. The second treatment proved very satisfactory and is particularly recommended where increases are desired, as the best of the older queens may be used to requeen nuclei. The past season was unusual and there appeared to be a great tendency for the bees to make swarm preparations during slack periods. This statement applies particularly to the Carniolans and Caucasians.

A COMPARISON OF DIFFERENT SIZES OF HIVES

Comparisons were made between the standard ten frame Langstroth and the ten frame Jumbo hives. In 1926 the Jumbo hives gave slightly higher yields of honey. In 1927-28-29 this was not the case as the Langstroth hives gave slightly better yields. It was found that the brood chamber of the ten frame Langstroth was hardly large enough for a prolific queen, but the addition of a half or shallow super, as used for the detection of swarming, gave ample room and, in addition, was much easier to manipulate than the Jumbo. Jumbo brood chambers necessitate Jumbo supers if interchangibility of frames is desired which when filled with honey, weigh at least 100 pounds. These are much too heavy for the average man to manipulate with ease. The Jumbo brood chamber is suitable for a prolific queen. The average queen, however, will build up more quickly in a ten frame Langstroth brood chamber, and a shallow super can always be added if it becomes necessary.

EXTENSION AND IMPROVEMENTS

During the year the dairy barn which had not been painted since 1913, and the two horse barns which were also very weather beaten were greatly improved by a coat of paint. A serious fire risk was removed by the erection of an 8 stall garage some distance from the other buildings to house the farm tractor and cars used by the staff.

Members of the staff judged live stock, poultry, flowers, vegetables, and grains and grasses at a number of fairs in the province. Whenever possible reasons are given for placings, which is quite an educational feature, and might well be practised by all judges. Numerous meetings of farmers' organizations were addressed on various topics. One of the subjects most in demand was the growing of forage crops and weed control.

There is an increasing demand from farmers for more experimental work, and more information, on almost every phase of farm work. During the year the most insistent demand has been for information on the control of weeds by cultivation and the use of chemicals, on the use of commercial fertilizers, and on diseases and methods of raising of both swine and poultry. The possibility of much further expansion in field experiments is limited by the lack of available land, but experiments have been started with fertilizers, and in methods of weed control. As far as finances and staff will permit further experiments are being started with swine and poultry.

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